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CONCURRENT RESOLUTION ON THE BUDGET FOR FISCAL YEAR 1988

HEARINGS

BEFORE THE

COMMITTEE ON THE BUDGET
UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

FIRST SESSION

NATIONAL SECURITY

JANUARY 13, 1987—VIEWS OF THE SECRETARY OF DEFENSE

FEBRUARY 18, 1987—OUTSIDE DEFENSE EXPERTS

INTERNATIONAL AFFAIRS

JANUARY 23, 1987—VIEWS OF THE SECRETARY OF STATE

SCIENCE AND SPACE TECHNOLOGY

FEBRUARY 4, 1987

MARCH 9, 1987

Volume II of IV

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CONTENTS

HEARINGS

Page

January 13 and February 18, 1987—National Security 1, 205

January 23, 1987—International Affairs 337

February 4 and March 9, 1987—Science and Space Technology 427, 509

STATEMENTS BY COMMITTEE MEMBERS

Chairman Chiles 1, 205, 337, 427, 509

Senator Domenici 5, 206, 340, 429

Senator Lautenberg 430

WITNESSES

Augustine, Norman R., chairman, Defense Science Board Task Force on Defense Semiconductor Dependency 557

Bloch, Erick, Director, National Science Foundation 431

Boyd, Dr. Joseph A., chairman, Harris Corp 571

Burns, Dr. Jay, Florida Institute of Technology 614

Chainer, Jan, on behalf of Dan Scheurer, assistant superintendent for instruction, Brevard County School System 613

Crowe, Adm. William J., Jr., USN, chairman, Joint Chiefs of Staff 130

Epstein, Dr. Joshua, the Brookings Institution, Washington, DC 224

Keller, Dr. Joe, dean of instruction, Brevard Community College 616

Kent, Lt. Gen. Glenn A., senior staff member, the Rand Corporation, Washington, DC 208

Merrick, George B., vice president, North American Space Operations, Rockwell International 589

Myers, Dale, Deputy Administrator, National Aeronautics and Space Administration 512

Oplinger, J.T., vice president, Lockheed Space Operations Co 604

Ordahl, Charles, vice president, space station program, McDonnell Douglas Astronautics Co 599

Rankine, Brig. Gen. Robert, Director of Space Systems, U.S. Air Force 527

Ross, Dr. Ian M., president, Bell Laboratories 465

Shultz, Hon. George P., Secretary of State 342

Trivelpiece, Dr. Alvin W., Director, Office of Energy and Research, U.S. Department of Energy 452

Weinberger, Hon. Caspar W., Secretary of Defense 7

Zimonis, Joseph, vice president for rocket and small gas turbine engineering, Pratt & Whitney 598

Zumwalt, Adm. Elmo R., Jr., USN (retired), former Chief of Naval Operations and member of Joint Chiefs of Staff 226

ADDITIONAL MATERIAL

Q. and A.—Committee questions to witnesses, written:

- Dr. Trivelpiece 504
- Secretary Weinberger 201

NATIONAL SECURITY

TUESDAY, JANUARY 13, 1987

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 9:40 a.m., in room SD-608, Dirksen Senate Office Building, Hon. Lawton Chiles (chairman of the committee) presiding.

Present: Senators Chiles, Johnston, Sasser, Riegle, Exon, Lautenberg, Simon, Sanford, Fowler, Conrad, Domenici, Grassley, Kasten, Quayle, Danforth, Nickles, and Rudman.

Staff present: Richard N. Brandon, staff director; Douglas Cook, group leader for national security; and Randy DeValk, staff analyst for national defense.

For the minority: G. William Hoagland, staff director; Charles Flickner, senior analyst for international affairs; and Paul Heilig, senior analyst for defense.

Chairman CHILES. Good morning. We understand that Senator Domenici is on his way, so I think I will begin with my statement.

OPENING STATEMENT OF CHAIRMAN CHILES

Mr. Secretary, we want to welcome you and Admiral Crowe to the committee. We are pleased to have you with us today.

During your years as the Secretary of Defense, you have been a consistent stalwart in the pursuit of a strong military. And, despite the economywide need to hold down the deficit, together I think we have rebuilt our military. Our men and women of our armed forces have seldom had a more loyal or articulate spokesman.

SIZE DOES NOT DETERMINE STRENGTH

Today, no one can deny that our armed forces pack an awesome punch. Yet, like most heavy weights, there is a tendency to believe the more weight you have, the stronger you will be. Experience tell us that is not always the case.

If we carry more military weight than we can handle, we may be bigger but not necessarily stronger. And if we want to stay on top, we have got to know our adversaries, master a sensible strategy and hold to a program that keeps us ready to deliver if the need arises.

Some heavy weights never learn that lesson, and all the wealth they accumulate goes to waste, leaving only laurels while someone else takes the title.

I think we should also note what we have accomplished since the beginning of the build-up in 1978. In this decade of defense, we have spent more than $2 trillion on our armed forces. In so doing, we have added half a trillion dollars to the defense funding base.

This enormous investment has funded the broadest modernization program in our nation's history. Today we build twice the number of tanks, major warships and attack submarines than we did in 1980. And if you look in any major theater, we are better off today than we were a decade ago.

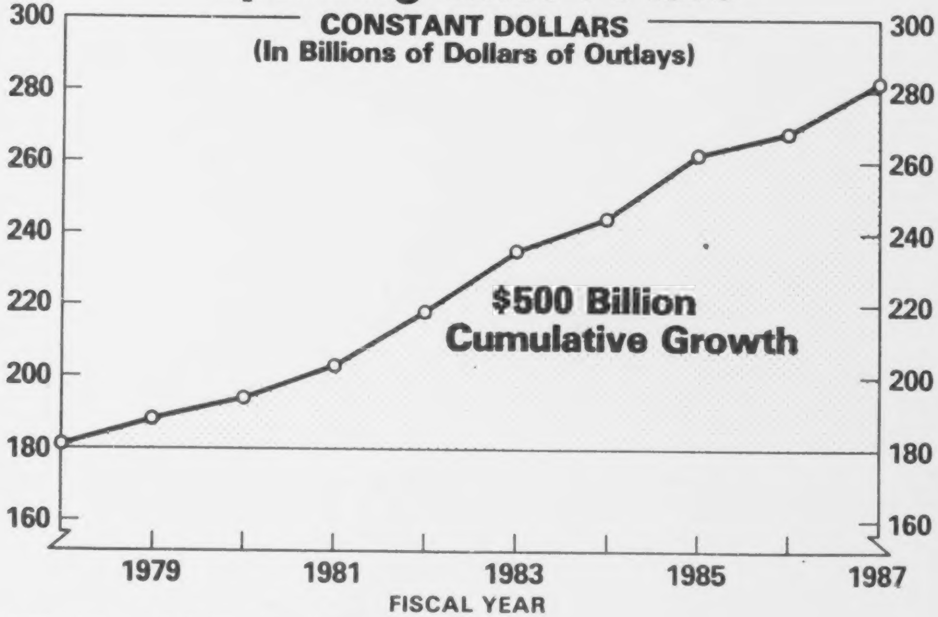
I believe this is especially true in NATO where Generals Bernie Rogers and Glenn Otis have provided the kind of vision and creativity that is often rare in the peacetime military. For the first time in a generation, field commanders are actually talking about where they might win and how they might win in a conflict in Europe. I am sure the Soviets have taken a look at the kind of troops, equipment and training that we are providing in NATO and it has given them pause. Now, that is deterrence—good, well-equipped troops led by tough, positive officers.

As you know, Mr. Secretary, we have had your budget for only a week and we have not received the detailed back-up. Even so, we have some concerns.

"REAL GROWTH" NOT NECESSARY

Once again, your budget is focused on "real growth." The request this year is 3 percent. Certainly, that is much more realistic than some previous years. However, there is little evidence that the budget is connected in any logical way to a set of national security objectives. Without this necessary connection, we again will fight the mindless battle of "real growth" instead of working to determine what funding we need for "real defense."

The chart I have up now addresses investment, and the top line misses the mark on a number of counts. First, it fails to recognize what we have already accomplished. As I noted earlier, we have invested over $2 trillion in the last decade while adding a half a trillion to the funding base. More to the point, the last 30 year's history indicates that previous waves of investment have crested and fallen off as capital expenditures were made. In the case of a ship, a tank or an airplane, this equipment is designed to last 10 or 20 years. It is neither wise, prudent nor cost-effective to replace our inventories as soon as they are purchased.



$500 Billion in Additional Defense Spending Since FY1978

Prepared by: Senate Budget Committee, January 5, 1987.

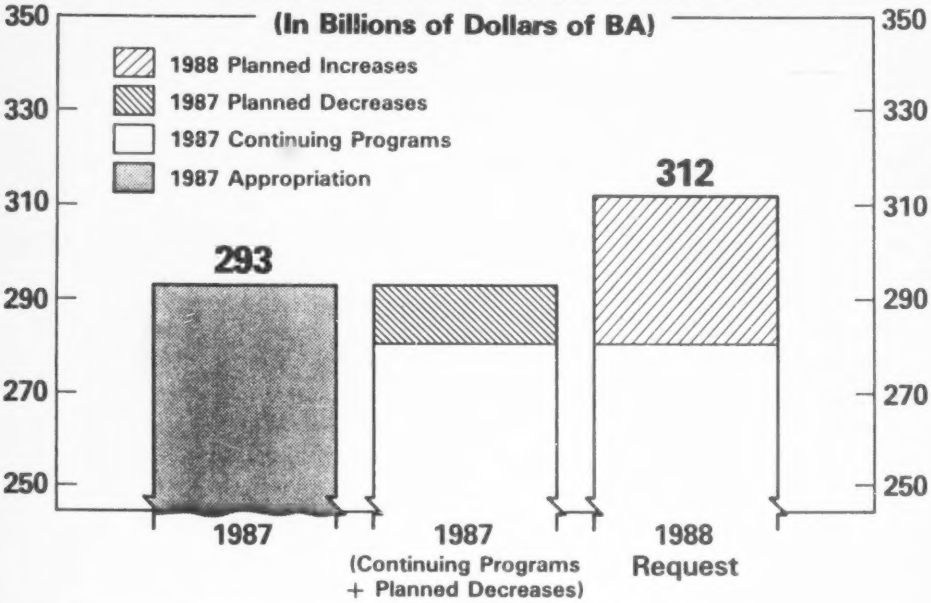
We have begun to complete this current investment cycle. For instance, the Air Force has purchased the last complement of 100 B-1 bombers and C-5 transports. We have paid for the B-1 bombers. Now, we are going to pay a little to fix them and get them to work a little better. The Army is buying out the AH-64 helicopter line and is nearing the end of a number of its production lines. The Navy purchased two aircraft carriers in 1983 at a cost of $7 billion and the next year had no requirement for aircraft carriers. But DOD still had that $7 billion in their funding base to spend elsewhere.

We should give ourselves credit when we buy something and not pretend that we have to keep buying the same thing year after year. My point is that we can continue to improve "real defense" without necessarily adding to the "real growth" in the defense budget. "Real defense" is measured by the growth of our capabilities, not the growth of the top line.

$32 BILLION REQUESTED IN PROGRAM INCREASES

In order to do this, we have to look below the top line at what is actually occurring in the defense program. This year, CBO is helping us in this effort. A preliminary CBO analysis based on the DOD budget data we have now received indicates that when we account for the planned decreases in your budget, you are really asking us for approximately $32 billion in program increases. If we looked at the top line, we would only see $20 billion in increases from last year's funding level.

1988 Defense Increases
$32 Billion in Planned Increases



Senate Budget Committee Staff/Congressional Budget Office, January 10, 1987

Mr. Secretary, we are going to work closely with you to review your priorities. We will keep in mind that with the nature of the Soviet threat we have to be bold enough to start new programs. I have said that on the domestic side of the budget we have to be bold enough to replace some old programs to make room for some new initiatives to increase our economic power. In the same way, as we review your priorities for the $32 billion of requested increases, we will also have to examine your $280 billion of continuing programs to see if there are places where we can make room.

Today, many in the administration note that in the last 2 years, defense growth has been negative based on the mechanistic top line argument. The year following the Navy's purchase of those two aircraft carriers, Secretary Lehman argued that he had suffered a real decrease in his budget. OMB officials reminded him that he was not buying any carriers that year, and when you factored those out, he had an increase.

Recent history also teaches us that Congress has to be cautious, skeptical and selective in its review. In 1986 and 1987, Congress reduced the President's request by nearly $70 billion with little, if any, significant effect. This has become known generically as the "pricing" problem. It derives from overstating the cost of doing business coupled with overestimating the rate of inflation. It is clear if Congress does not exercise its responsibility to give this budget a fine scrub, we risk spending a good deal more than we can afford.

Mr. Secretary, of your $32 billion increase, about $8.2 billion is for research and development. Of that, $2.5 billion is for a 66 percent increase for SDI. I believe Congress will continue to support a robust SDI research program.

However, to date, we have not received a systems architecture or a plan that tells us how and when you plan to deploy the SDI. With so little to go on, it is rather difficult to support an increase of this magnitude. We need to be sure that we do not cut off promising research by pushing for unrealistic development and deployment schedules.

POSITIVE AGENDA CAN BE REACHED

Finally, Mr. Secretary, "real defense," as opposed to real growth, is connected to how these $32 billion in line-item capabilities underwrite the strategies to accomplish our national objectives and prepare us for potential conflicts. I am confident we can work with you if you will share with us your priorities, and justify them in terms of these national objectives.

I am also confident that we can agree on a positive agenda that would include: attracting and supporting top military personnel; increasing our logistics sustainability in Europe; developing a more effective individual antitank weapon for our soldiers and marines; supporting and refining tactics and logistics for our special operations forces who will have to fight the most likely wars of the future; increasing the realism and tempo of our combat arms training with the kind of ideas which come from the Army's National Training Center; and maintaining our technological lead over the Soviets. In this area, I am very concerned about our growing dependence on foreign countries for our most technologically sensitive systems. I understand one of our top national labs was forced to go abroad to purchase instrumentation for some of its most secure research projects. I might ask you, Mr. Secretary, to provide expert witnesses on this for a closed hearing at a later date.

Most importantly, we should return to the days of bipartisanship on national security policies. Providing the funding necessary for "real defense" is no longer an issue. And "real defense" will not be defined by a top line number but by a strong and competitive economy, a united and bipartisan foreign policy and the national security capability necessary to execute the objectives of that foreign policy.

In closing, I want to thank you for the time and effort you have put forth in developing a 2-year budget in this submission. We certainly look forward to working with you.

OPENING STATEMENT OF SENATOR DOMENICI

Senator Domenici. Thank you very much, Mr. Chairman.

First, let me apologize to you. I understand you waited. I actually had a mistake on my schedule. I thought the hearing started at 9:45. I apologize for that. I was not wasting my time. I was trying to get ready for this hearing. Thank you very much, again, Mr. Chairman, for yielding to me for a few moments.

2-YEAR BUDGET SOUGHT

Mr. Secretary, good morning, and Admiral Crowe, it is a pleasure to have you here again. By my count, Mr. Secretary, this is your seventh appearance before the Budget Committee. And while you have submitted at the request of Congress a 2-year budget for fiscal year 1988 and fiscal year 1989 I assume you thought maybe you might not have to appear next year.

Secretary WEINBERGER. Of course.

Senator DOMENICI. I hope we are able to accomplish that. Perhaps, before we are finished in the next few weeks——

Chairman CHILES. We want you to come back anyway.

Senator DOMENICI. We want you to come back and inform us, but some of us are hopeful that we will get 2-year budgets and 2-year appropriations. We have started in our normal way by telling you to submit a 2-year budget. We have not decided what we want to do ourselves yet.

REQUEST IS EQUIVALENT OF CURRNET POLICY BASELINE

I want to congratulate you on the budget that you have sent to us, Mr. Secretary. I know that some in Congress have criticized the fact that the budget that you have submitted contains real growth. You say it is 3 percent; I believe under normal practices that we use here that you are correct in saying that it is 3-percent real growth. But as described on Page 3.4 of the budget, the real essence of it is that it maintains current capability that we approved last year.

In other words, this request, using normal budget language, is the equivalent of a current policy baseline, as I understand it. The growth in funding is required to accommodate a weapons program that Congress initiated in the past and to operate and support weapon systems purchased in previous years that are now being developed. You have stated it in your budget. I have looked at it, and I think it is right.

REQUEST FOR DEFENSE SPENDING NEAR HISTORICAL LOW

We have heard a lot of rhetoric about the President's "defense build-up" and its emphasis on expensive weapons. There are some interesting facts about the request that I want to emphasize.

First is the fact that the request for defense budget authority for fiscal year 1988, $312 billion, is $30 billion lower than the fiscal year 1988 level in your budget for last year.

The second fact is that the request for procurement funding for 1988 is lower than the level Congress approved in the fiscal year 1987 budget, which is, in turn, lower than the 1986 level, which is, in turn, lower than the 1985 level. So I do not know where all the build-up is.

Finally, the CBO scoring for fiscal year 1987 defense appropriations is $284,300,000,000, which is less than the 1986 level, and, again, less than 1985. I assume you have had a difficult time adjusting to that, and I assume you will tell us something about that in your testimony.

If this is a "massive build-up," then I do not know anything about budgets. Some have argued that the defense budget crested at a very high level, yet if you compare defense spending as a percentage of Federal spending, or a percentage of gross national product with historical data, you will see that we are not at any high level, as some suggest. In fact, we are closer to a historical low than a historical high with reference to those approaches to comparisons.

I realize that these are not justifications for defense spending. We should spend for defense only what is needed, and that is determined by our national objectives and the threat to those objectives as we see them from unfriendly nations or those who do not agree with our idea about humankind and the world.

In the past years, fiscal considerations have also had an impact, and they will again this year and I think you know that.

AMERICANS SUPPORT DEFENSE

Two points: First, I do not believe we are spending too much on defense. I do not support every line item in your budget. You do not expect us to; no one does. That will have to wait its turn in the authorization and appropriation practices and approaches here in Congress.

But I believe we need to maintain the improvements that we have made over the last 6 years, and, Mr. Secretary, I think your budget does that. We cannot afford to let our capability erode as we did in the 1970s, and I do not think the American public wants that.

It is amazing. Some people in the Congress talk about the defense budget as if it is something the American people do not want, the American people do not support, or that the American people think it is not high on the priority list. None of those are true. Quite to the contrary, by large percentages, the American people support our defense, the Defense Establishment; they support those men and women in the military; and, indeed, they think you all are doing a better job than many others in society. If you compare them with others, the military comes out very high.

Mr. Secretary, I think we have attempted to do a number of good things in the past, and I trust that we can work together to get a budget here that will maintain the good things that you have been able to accomplish in the past 6 years.

Thank you, Mr. Chairman.

Chairman CHILES. Thank you, Senator Domenici.

Senator Johnston.

Senator JOHNSTON. Yes, very briefly, Mr. Chairman.

Mr. Chairman, I will withhold on opening statement and just ask an extra question, if I may.

Chairman CHILES. Mr. Secretary.

STATEMENT OF HON. CASPAR W. WEINBERGER, SECRETARY OF DEFENSE

Secretary WEINBERGER. Thank you very much, Mr. Chairman and members of the committee. I certainly appreciated your kind comments in the opening part of your statement, Mr. Chairman, and we will try to live up to them. I know that the military will also appreciate them very much.

I also appreciated very much Senator Domenici's statements. He has relieved me of the necessity of making a lot of points I was going to make because he has already made them and I agree with them in full. We will certainly try our best to present to you the reasons for the budget and why it is here, and we will have the detailed justification, Mr. Chairman, very shortly. As you know, it takes about 40 or 50 books stacked about 5 feet high to justify everything. That is not because it is hard to justify, but because we like to do it in the detail that the committee has indicated in the past.

BUDGET NOT FOCUSED ON REAL GROWTH

I have a comment or two about some of your points in your statement, Mr. Chairman. I want to emphasize that you said our budget is focused on real growth. Actually, this is not the case. This is the way it is written up. These are the things that many people look for and the way they measure our budget. Is it 6 percent? Is it 3 percent? And then from that they draw conclusions.

Our budget is not focused on real growth. Our budget is focused on what we need, measured by the nature of the threat and taking into full consideration the decreases that we have had in real terms in the last 2 years.

Now, with the threat increasing and with our own resources decreasing, it has been, as Senator Domenici said, a very difficult job to come in at these levels. They do turn out to be three percent real growth. But it is not focused on that, and I agree with you completely that what we need is real defense. We believe that we are getting it.

You mentioned a couple of points about the B-1, and I would like to take some time on that a bit later to show you it is a good airplane and it will perform all of the missions required of it.

DEFENSE CAPABILITY WEAKENED BY CUTS

You also said, Mr. Chairman, that Congress reduced our request nearly $70 billion with little, if any, significant effect. We are afraid it had a very significant effect, and we are prepared to show you some of the things we gave up. We will not be able to say this year that those things have brought war closer or any apocalyptic statements such as that. But we will certainly have a very clear weakening of the defense capability of the United States as a result of those cuts. And we very much hope that the Congress will not impose a third year of real reductions because that kind of reduced funding will definitely hurt the defense effort and the security of the United States. What it does is increase the risk that we face.

We all know that there is always a risk in any solution to the problem of how much is enough, and it is our task and our responsibility to try to reduce that risk as much as possible.

Obviously, Congress has other priorities that it has to consider and it must make the final decisions as to the degree of risk we are willing to assume. But no one should feel that we can absorb cuts of this kind without having very significant decreases in the military strength of the nation and, consequently, very real increases in the risk that the nation faces.

ROBUST SDI PROGRAM SUPPORTED

The other point, I think, that you mentioned with respect to SDI is that you do support a robust program, and I am delighted to hear that. You had mentioned that you have not received a systems architecture or a plan which tells us how or when we plan to deploy it. General Abrahamson is fully prepared to brief you and all the members of the committee any time you wish.

The systems architecture is obviously what we are spending the money on while trying to decide which is the best of several systems, and we may, indeed, go with more than one system. That is what the money is for, and that is why it is so important to keep funding the research that can lead to deployment. This is not only an extremely high priority of the President, but it is also, we believe, the most hopeful strategic concept that has been put forward in at least 40 to 50 years.

NATURE OF THREAT MUST BE LOOKED AT

Then you made the point that we should connect our requests to our general strategy, and we spent considerable time yesterday with your colleagues on the Armed Services Committee going into those precise points. That is exactly how our budget is formulated. We look at our goals, which are simply to be allowed to continue in peace and freedom to live the kind of lives we want without aggression against us or our allies.

We look at the threat to that very modest goal. We see that it is a very considerable threat. We look at the nature of that threat and the growing Soviet military capability, not only to project its power in many parts of the world at once, but its growing capability to deal with a number of NATO defenses in a way that requires very strong counteraction. We look at the need to convince the Soviet Union that they could not make an attack on us or our allies anywhere with any degree of success, and from that we construct our budget. That is what we have done since 1981, and I assume it is essentially what my predecessors did.

It does require a substantial degree of funding. We cannot look at it in isolation. We cannot decide our budget without reference to the nature of the threat. That is why we have a budget before you, and we are fully prepared to show the way in which the individual items do relate to the nature of the threat and what we feel we must do.

We have not simply constructed it out of thin air or developed something that gives us 3-percent real growth. We have constructed it on the basis of what we need, and we have eliminated a great many things. We have reduced a great many things to try to get into a range that would enable us to report to you that what we are bringing you is a budget that has already been scrubbed and has already been reduced to what we believe is the minimum necessary to preserve the security of the United States in the years for which it is designed to be expended.

With that, Mr. Chairman, I would appreciate it if you would enable me to put quite a long statement in the record without troubling you with reading it.

Chairman CHILES. It will certainly be included.[1]

Secretary WEINBERGER. Thank you, sir.

We also have a somewhat shorter presentation that I will try to reduce, in which we go through some of the principal points of the budget.

Chairman CHILES. We welcome that. As you can see, we have a number of members here, and I know they would all like to ask questions.

Secretary WEINBERGER. I will appreciate the questions, too, so I will try and hold this down. There are two or three of these major points that are here.

BUDGET REFLECTS REQUIREMENTS FOR 2 FISCAL YEARS

The first is that the President and I have both been long-time supporters of a 2-year budget, have desired to introduce some of the same concepts from California, and we requested that we be permitted to submit a 2-year budget. I am delighted that the Congress endorsed that and required it, authorized it, and specified it. This budget reflects our real requirements for the 2 fiscal years.

It is not a 1-year budget with an outline of the second year. It is a genuine 2-year budget. Part of the motive behind it was already identified by Senator Domenici; that is, we thought there would be no hearings required next year [Laughter.]

But we do have a full 2-year budget before you, and I think it will show in considerable detail the programs that we need and will enable us to acquire them on a more rational planning base. It will avoid, we hope, the rollercoaster funding profiles that have plagued defense. We hope it will give a degree of program stability and allow us the needed modest growth, along with the achievement of the economies of longer range planning.

These make up the standard opening charts for your benefit, Mr. Chairman, with which I know you are already familiar. They show the total budget authority requested for the 5-year plan, fiscal years 1988 to 1992, and the estimated production outlays, along with the Department of Energy and FEMA and other activities included in the 050 function.

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[1] See p. 68.

CHART 1

NATIONAL DEFENSE TOPLINE - 050
(Current $ Billions)

	1987	1988	1989	1990	1991	1992
BUDGET AUTHORITY						
DoD TOTAL	281.7	303.3	323.3	343.9	364.9	386.5
DoE & Other	8.0	8.7	9.1	9.6	10.1	10.4
TOTAL 050	289.7	312.0	332.4	353.5	375.0	396.9
OUTLAYS						
DoD TOTAL	274.2	289.3	303.7	321.0	340.0	361.0
DoE & Other	8.0	8.3	8.5	9.0	9.5	9.9
TOTAL 050	282.2	297.6	312.2	330.0	349.5	370.9

This is the budget authority requested in fiscal years 1988 and 1989 for defense and the outlays that we believe will flow from that. As you see, there has been a real reduction instead of real growth in 1986 and 1987, amounting to 6.7 percent. And as you can see, the amounts requested for 1988 and 1989, the 2 years that are now before you, do not make this up.

CHART 2

FY 1988/FY 1989 DoD BUDGET
BUDGET AUTHORITY & OUTLAYS
(Current $ Billions)

	FY 1986	FY 1987	FY 1988	FY 1989
BUDGET AUTHORITY	281.4	281.7	303.3	323.3
% Real Growth	-4.2%	-2.5%	3.0%	3.0%
OUTLAYS	265.6	274.2	289.3	303.7

QUALITY OF PERSONNEL IS HIGH

Indeed, the whole period, from 1980 through 1986 that I have been here has been quite tumultuous for defense. We have seen the

Congress embrace the revitalization program, and give us bipartisan support; more recently, we have seen that support wane and defense funding levels have reflected negative growth. But we still have seen very dramatic improvements. We have higher quality personnel, better trained, more experienced people—this is what we are most proud of and what I think, is most important for all of us.

In the final analysis, every commander, everyone connected with the military on the civilian or the military side feels that people are our first priority, and we are extraordinarily proud and pleased with the way that priority has been served.

We also have growing inventories of more modern equipment. The performance of the people and equipment is superior to anything that we have seen for quite a long time.

PRESIDENT'S REQUEST RECEIVES HEAVY REDUCTION

We have these figures that I know you are now all familiar with, so I will not spend too much time on that. Let us see the next one.

CHART 3

CONGRESSIONAL REDUCTIONS TO THE PRESIDENT'S DoD BUDGET REQUESTS

(Current $ Billions)

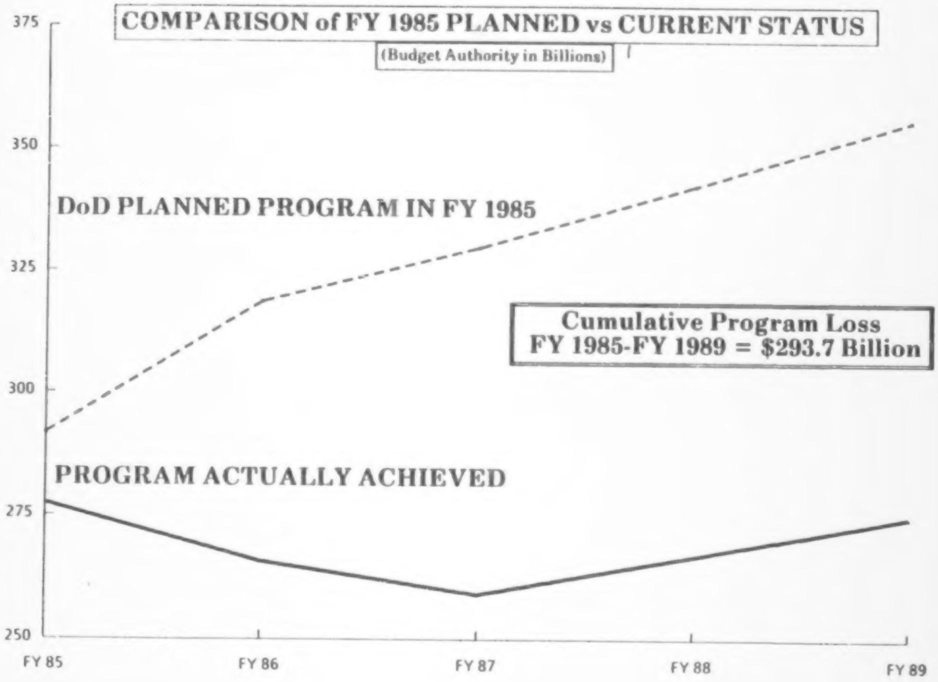
	1984	1985	1986	1987
PRESIDENT'S REQUEST	**273.4**	**305.0**	**313.7**	**311.6**
Congressional Reductions	-14.7 (5.4%)	-19.5 (6.4%)	-35.3 * (11.3%)	-29.9 (9.6%)
ENACTED **	**258.7**	**285.5**	**278.4**	**281.7**

* Includes $11.0 billion sequestered under G-R-H.

** **Excludes Contract Authority.**

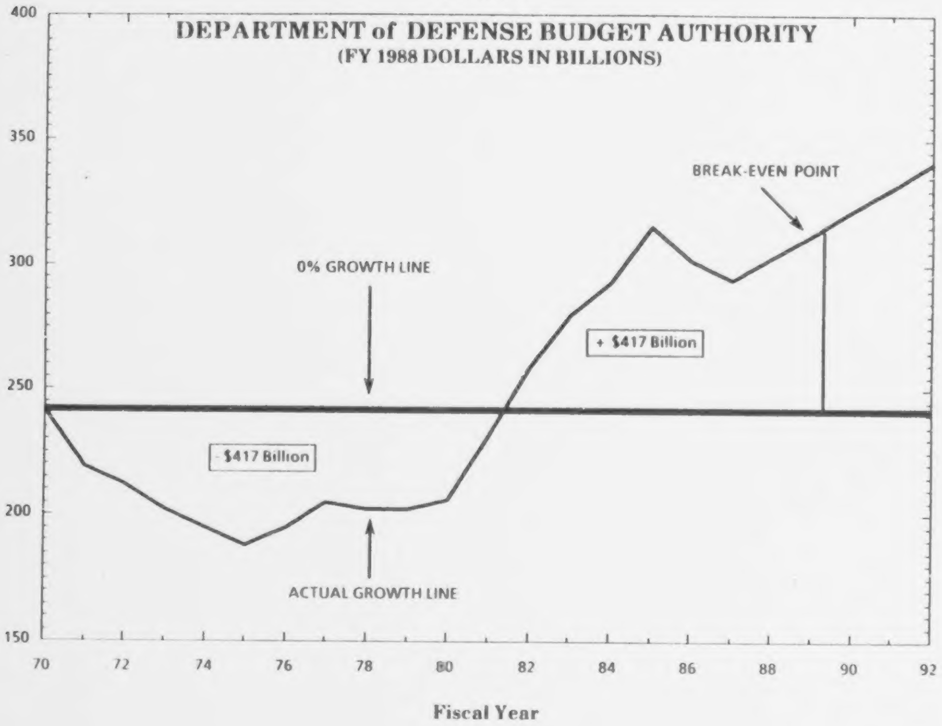
This is what has happened over the past few years with respect to the President's request and the reductions that have been imposed by this and other committees as the bill worked itself through the Congress. You will see a particularly heavy reduction of $35 billion in 1986 and about $30 billion in 1987. These, I think, are the figures you referred to in your statement, Mr. Chairman, and they are figures which certainly cannot have been accommodated without major difficulty, major reductions in the military strength, and major additions to the risk the nation faces.

CHART 4



This shows the program achieved and the program planned in 1985. You will see that the loss in those 4 years was about $300 billion. Many will say that you did not need all that growth, you did not need the amount requested, we did not really hurt you at all. I have to tell you, Mr. Chairman, that there is no way that reductions of this kind can be accommodated without substantial impacts on readiness, on sustainability, on morale, on our allies, and on our opponents. They have, however, been accommodated.

CHART 5



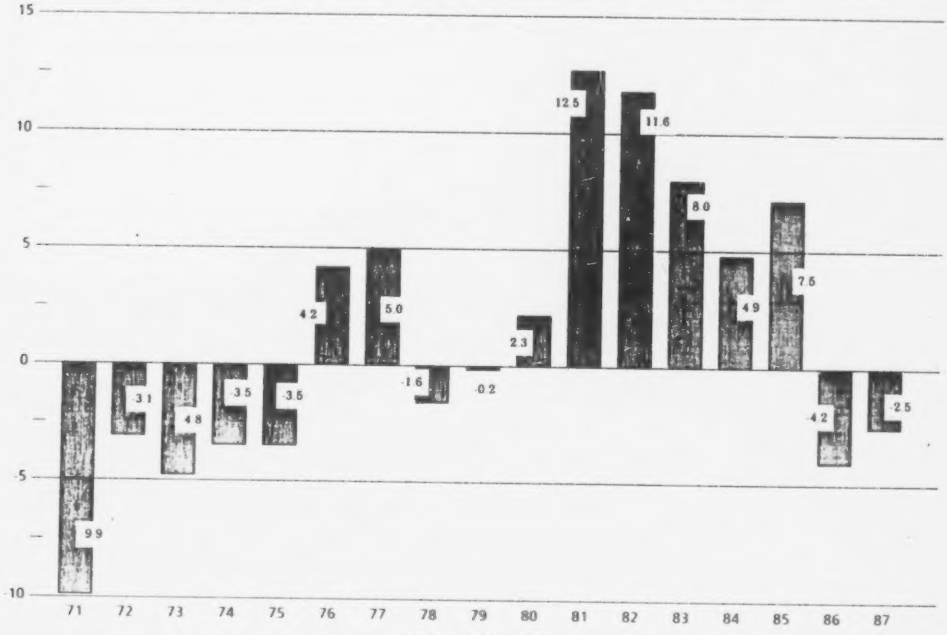
Here is what has happened since the decade of the 1970s. You will recall that in that decade under various administrations and different parties, we went down $417 billion. It will be 1990 before that amount can be reached, even under the present plan. The problem is—it takes a lot more than $417 billion to regain the military strength that has been lost after a drop of $417 billion covering a 10-year period.

Had a zero growth line been maintained during that whole period, the kind of build-up you see in blue would not have been necessary. We would have been able to maintain our strength right straight through.

We would also, I dare say, have had a considerably better opportunity for a successful foreign policy because the Soviets would have realized that America was retaining its strength.

CHART 6

REAL GROWTH IN DEFENSE BUDGET AUTHORITY



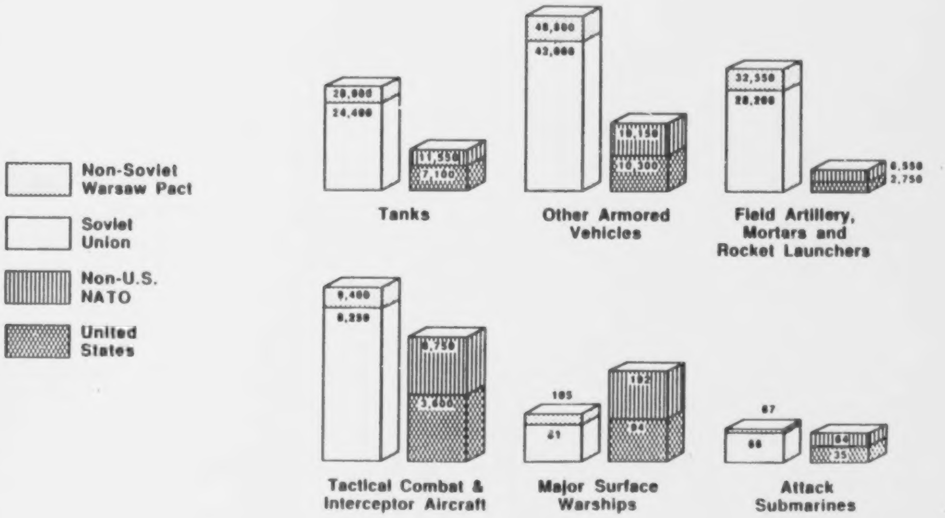
The next chart shows, in very graphic form, what happened during the 1970s, and it is, from our point of view, not a very pretty picture. In fact, it is a very dangerous picture.

Because we have recovered so much strength from the neglect in the 1970s, the most worrisome thing about it is the last two red bars which show the amounts that have been reduced in the last 2 years.

CHART 7

PRODUCTION OF SELECTED WEAPONS FOR NATO and WARSAW PACT FORCES

(1977 - 1986)



NATO AND WARSAW PACT COMPARED

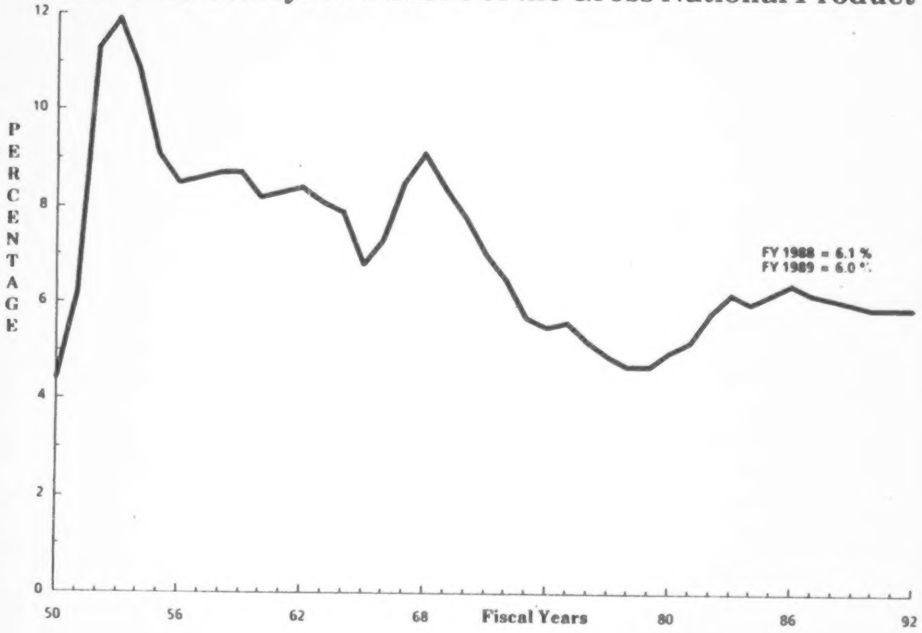
The reason we worry about it is displayed on this chart which shows some of the comparisons between NATO and Warsaw Pact. We are frequently told that we have compared only the U.S. and the Soviet Union. That is not true. We have compared NATO and Warsaw Pact forces over these years, and you can see the amounts that have been added on to their forces and the degree that they are in front in all of these numerical comparisons. Major surface warships is about the only one in which we have anything like a lead.

This is important because these are areas of very real conventional strength. It also illustrates, Mr. Chairman, the difference between the systems. In the Soviet Union, three or four men in the Kremlin will sit down and decide on a steady increase which they have had now for 23 years. They can do it without an up and down, without surging and starving, without any reference to public opinion—which does not exist in the Soviet Union—and it gives them an advantage. It does not give them any advantage we want to copy, but it does give them one advantage that we should recognize: It gives them a major military advantage, and it gives them the ability to plan on a very long-range basis and to acquire an enormous quantity of very good equipment, a lot of it based on technology stolen from us.

Some have asked whether we can afford the kind of defense we are talking about in the next 2 years. What we have here are the outlays as a share of gross national product. They are at 6 percent in the 2 years we are talking about, 6 percent of the GNP, and that does not indicate any kind of major deviation from the past. The only deviation is that it is very much lower than it was in the 1950s when we were about 12 percent of the GNP.

CHART 8

Defense Outlays as a Share of the Gross National Product

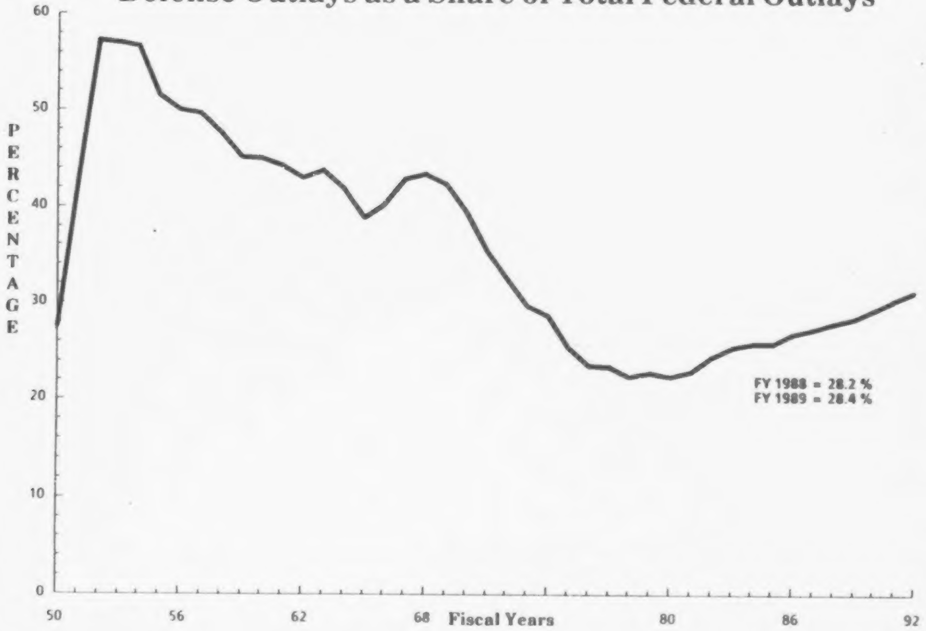


DEFENSE SHARE OF TOTAL FEDERAL BUDGET

The next chart shows the same thing as a share of the total federal budget. Here again, we are about 28 percent of the Federal budget as opposed to the 59 percent that we were in the 1950s. So, again, we do not have anything really to worry about if the question is can we afford it.

CHART 9

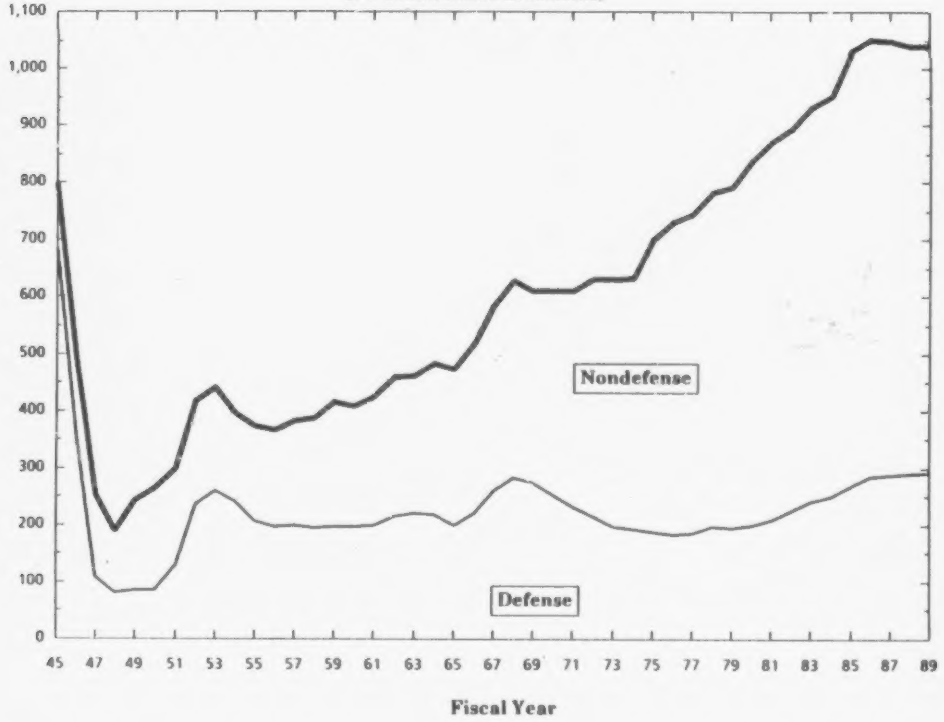
Defense Outlays as a Share of Total Federal Outlays



On the rest of the budget, I think it is important to point out that defense is not the culprit. Defense increases have not added so materially to the deficit that we are all concerned about. Non-defense expenditures have caused that, from the 1970s right through to the present time.

CHART 10

TOTAL FEDERAL OUTLAYS
(FY 1988 Dollars in Billions)



What should also be pointed out when you are talking about deficit is the amount that defense contributes to the revenues of the country and to the well-being of the country. That is not why we do it, but that is a byproduct that we must recognize.

CHART 11

FY 1988/FY 1989 DoD BUDGET
BUDGET AUTHORITY BY TITLE
(Current $ Billions)

	FY 1986 Dollars	% Change	FY 1987 Dollars	% Change	FY 1988 Dollars	% Change	FY 1989 Dollars
MIL PERS	67.8	8.8%	73.8	6.2%	78.3	4.2.%	81.6
O & M	74.9	4.9%	78.5	10.2%	86.6	5.7%	91.5
PROC	92.5	-7.9%	85.2	-1.4%	84.0	12.7%	94.6
R D T & E	33.6	7.1%	36.0	21.5%	43.7	1.2%	44.3
MIL CONS	5.3	-2.8%	5.1	28.6%	6.6	4.6%	6.9
FAM HOUS	2.8	11.3%	3.1	11.7%	3.5	5.7%	3.7
OTHER	4.5	-	-	-	0.6	-	0.8
TOTAL	**281.4**	**0.1%**	**281.7**	**7.7%**	**303.3**	**6.6%**	**323.3**

Then the actual breakdown of the budget by titles—military personnel, O&M and so on—and again, you can see the various changes that are in here. Procurement went down. It goes down in 1988, comes back up again in 1989. Most of the other figures are self-explanatory. In the interest of time, I will not go into them in detail, but I will be glad to try to answer questions about them.

CHART 12

FY 1988/FY 1989 DoD BUDGET
BUDGET AUTHORITY BY MILITARY COMPONENT
(Current $ Billions)

	FY 1987		FY 1988		FY 1989	
	Dollars	Share	Dollars	Share	Dollars	Share
ARMY	74.5	26.4%	80.1	26.4%	84.8	26.2%
NAVY/ MARINE CORPS	95.3	33.8%	102.3	33.7%	108.7	33.6%
AIR FORCE	93.8	33.3%	100.4	33.1%	107.2	33.2%
DEFENSE AGENCIES/ DEFENSE WIDE	18.1	6.4%	20.5	6.8%	22.6	7.0%
TOTAL	**281.7**		**303.3**		**323.3**	

BREAKDOWN FOR SERVICES FAIRLY LEVEL

The other breakdown here is by service, and there has been some complaint made—not here, but elsewhere—that the Army is having very serious sharp reductions made. As you see, the services are basically fairly level, and there has been basically an equal distribution of the misery and difficulty caused by the reductions.

CHART 13

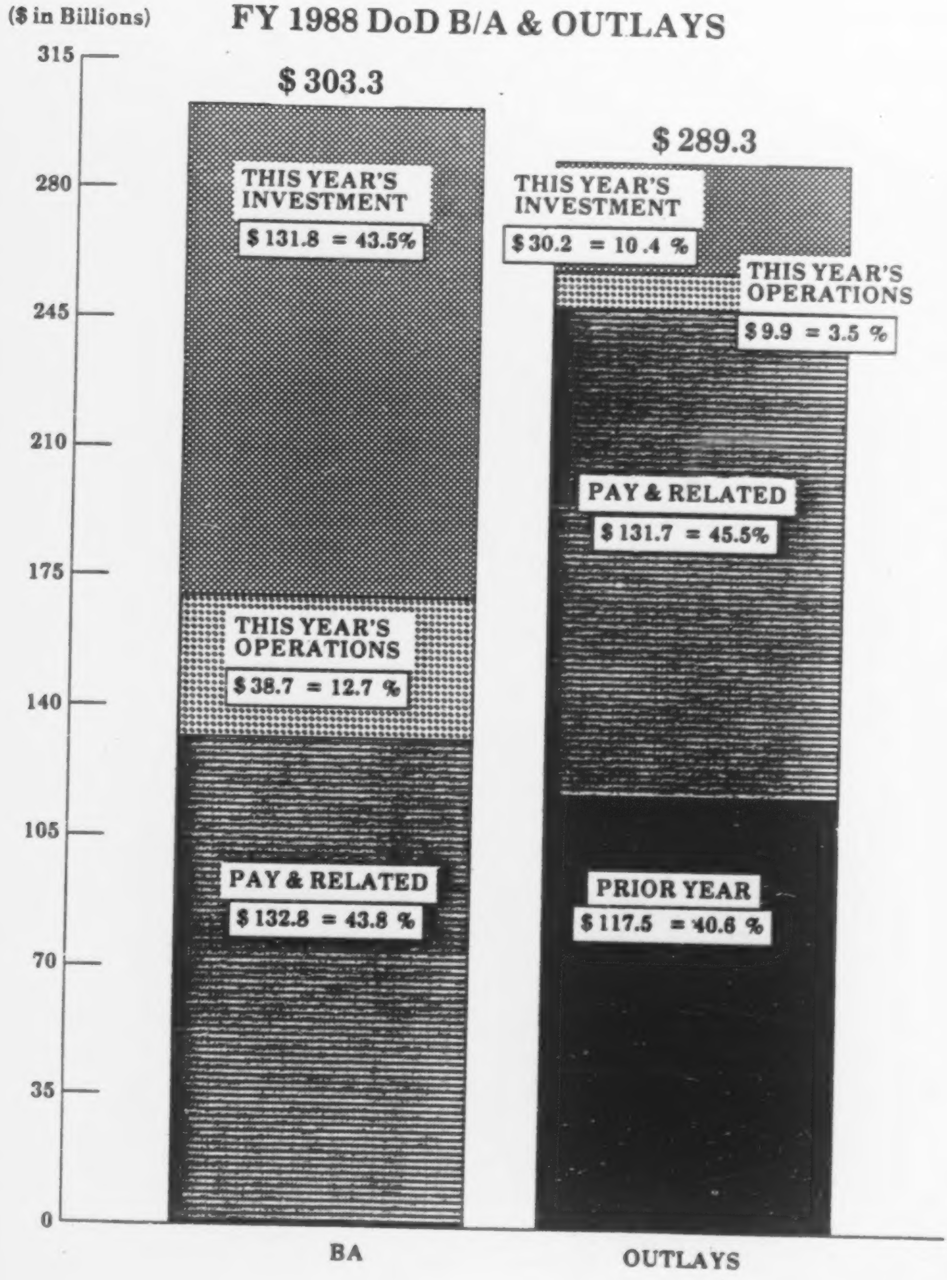
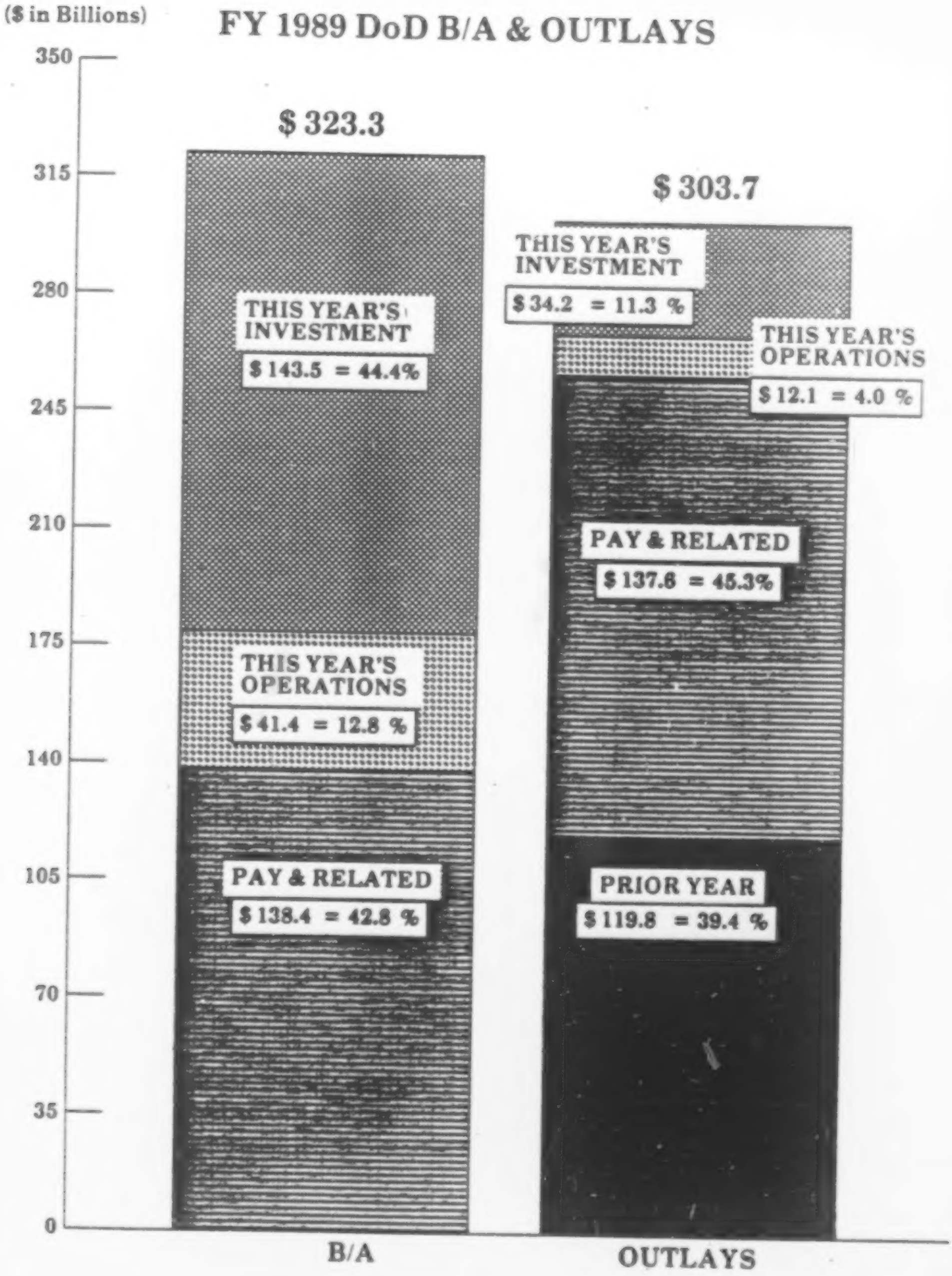

($ in Billions)
FY 1988 DoD B/A & OUTLAYS
315
280
245
210
175
140
105
70
35
0
$ 303.3
THIS YEAR'S INVESTMENT
$ 131.8 = 43.5%
THIS YEAR'S OPERATIONS
$ 38.7 = 12.7 %
PAY & RELATED
$ 132.8 = 43.8 %
$ 289.3
THIS YEAR'S INVESTMENT
$ 30.2 = 10.4 %
THIS YEAR'S OPERATIONS
$ 9.9 = 3.5 %
PAY & RELATED
$ 131.7 = 45.5%
PRIOR YEAR
$ 117.5 = 40.6 %
BA
OUTLAYS

CHART 14

FY 1989 DoD B/A & OUTLAYS



BUDGET CONTAINS FEW NEW PROGRAMS

These charts, this one and the next one, show essentially the degree to which we are prisoners of previous years' activity, and that there is very little that is actually new in this budget, in either fiscal year 1988 or the fiscal year 1989 budget. This year's investment is sometimes referred to as new starts. That is quite misleading because only about 4 or 5 percent of that investment is actually new starts. Most of the investment is a continuation of programs previously authorized. And the pay and related, again, shows around 42, 45, 43 percent of this year's operations. All of the others are basically self-explanatory.

If there are any questions about these, I will be delighted to try to answer them in the next period of the hearing.

Senator DOMENICI. Mr. Chairman?

Secretary WEINBERGER. The recruiting that I spoke about earlier——

Senator DOMENICI. Mr. Secretary, would you hold a minute?

Secretary WEINBERGER. Yes.

Senator DOMENICI. Mr. Chairman, could I just take 1 minute?

Mr. Secretary, I made an opening statement supporting this budget of yours, and I intend to do what I can to see that we carry it out. But I do not think you do us any good with that big chart [see chart 4, p. 13] that you put up there showing how much we have cut defense over your requests. You know that big one, $3 hundred and some billion you had there a little while ago, about five charts back?

Secretary WEINBERGER. Yes.

INFLATION IN CONTRACTS LESS THAN ESTIMATED

Senator DOMENICI. I really think when you put that up you ought to be more honest. And I do not mean that in the sense that the numbers are wrong, but I think you ought to break it down into its realistic components.

I mean, you understand that we cut because inflation was much higher in the budget than it turned out, which is a big amount. The big amount was the estimated inflation in contracts which turned out being much less; therefore, we did not need as much.

You understand that we had oil prices in that, when you bring the budgets up, that we are assuming it was going on up, as you remember, Senator Johnston, 25, 30 percent a year.

I think we ought to put that in there and at least take that chunk out, say those were overestimates that you never would have wanted. Is that not true, Mr. Secretary?

Secretary WEINBERGER. The oil pricing would remove some, not very much, not as much as is commonly supposed.

Senator DOMENICI. How about inflation generally?

Secretary WEINBERGER. Inflation generally is lower than was estimated in the beginning years of the President's first term. But we noted that his economic plans were working and that inflation was being reduced substantially.

It is important to bear in mind that there is a great deal of different inflation with respect to military item. Also, this chart [see chart 4, p. 13] only goes from fiscal 1985 to fiscal 1989. It represents the reductions in the plan program from 1985 on. There is very little oil and inflation that is not already accounted for and realized. It is not back to 1981.

Senator DOMENICI. It starts when?

Secretary **Weinberger**. It starts in 1985 and it is in constant dollars.

Senator **Domenici**. Well, I am just not going to make the point any more. I just think everybody ought to know that an awful lot of that reduction is not programs.

Secretary **Weinberger**. With constant dollars, Senator, inflation is already washed out of the chart.

I would return very briefly now to the military personnel situation, of which we are extremely proud——

CONSTANT DOLLARS PRESENT REAL TERMS

Senator **Lautenberg**. Excuse me, Mr. Secretary. You say inflation is washed out with constant dollars, but the reductions of cost for oil is not washed out.

Secretary **Weinberger**. That is part of the inflation. It is all taken out. Constant dollars, Senator, attempts to present it in real terms.

Senator **Lautenberg**. Right, but the reference there is strictly an inflationary reference. I mean, if you pay $20 a barrel for oil, and just a couple of years ago it got down to $10, that is not an inflationary factor. That is a market factor.

Secretary **Weinberger**. Well, the chart covers the period from 1985 to 1989. There is some prediction in it. In that prediction, we have washed out inflation and oil price changes because it is essential to present to you what has actually been reduced. From the President's original plan and in fiscal 1985 printed in the budget to now, there has been $293 billion taken out. That is not affected by inflation, oil pricing or the other things. That is why I have made the point that it is in constant dollars.

Senator **Armstrong**. Mr. Chairman, we had better pin it down. There is a lot of mumbling up here that this is not right. If it is not right, let us figure it out. I do not want to bog you down on it, but could somebody ask the question to clarify it?

Are these actually constant dollars, Mr. Secretary?

Secretary **Weinberger**. Yes. Yes.

Senator **Armstrong**. And we are saying that the price of oil is not a part of that big blue pie-shaped thing that represents lost programs between what Congress authorized and what the Administration asked.

Secretary **Weinberger**. The big blue pie-shaped thing, Senator, does not include any higher prices for oil than we would have to pay. It includes fuel because we have to buy fuel, but it does not include higher prices for crude oil than refiners actually paid for the petroleum products that we procured.

LOSES IN WEAPONS SYSTEMS

Chairman **Chiles**. I think our problem is we are in the top line mentality. What did we lose in weapons systems? What did we lose in troop reductions? What did we lose there ought to be what we are talking.

Secretary **Weinberger**. In just 1986 and 1987, 2 years out of this, we lost 36 MX missiles in fiscal year 1986 and 9 MX missiles the next year. We lost 78 tactical aircraft. We lost 45 other aircraft.

We lost 150 Bradley Fighting Vehicles. We lost 4,550 air launch missiles. We lost——

Senator JOHNSTON. Is this from the wish list?

Secretary WEINBERGER. Do you want me to go on or should I put it in the record? The losses are very real, and I will be glad to read them all or put them in the record, whichever you wish. But it is a very substantial set of losses. You cannot have it any other way.

[The following was subsequently supplied for the record by DOD:]

REDUCTIONS TO THE FY 1985 DoD PLAN
BUDGET AUTHORITY
(FY 1984 $ Billions)

	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989	CUM LOSS
MILITARY PERSONNEL	-1.7	-6.2	-3.4	-3.3	-3.7	-18.3
O & M	-3.2	-12.7	-16.8	-18.0	-20.2	-70.9
PROCUREMENT	-8.2	-26.9	-40.8	-47.6	-46.8	-170.3
R D T & E	-2.2	-3.0	-1.1	+ 1.3	-1.0	-6.0
MILITARY CONSTRUCTION/ FAMILY HOUSING	-1.7	-5.1	-5.7	-5.0	-6.1	-23.6
ALL OTHER	-0.9	-1.0	-1.0	-1.0	-1.0	-4.9
TOTAL DOD	**-17.9**	**-54.9**	**-68.8**	**-73.6**	**-78.8**	**-294.0**

Military Personnel
Reduction from FY 1985 Plan

- Five-year program reductions amounted to $18.3 billion from levels originally programed - an average of $3.7 billion per year.
- Funding reductions related primarily to decreases in programed strength of both active and reserve forces.
- Original programed end strength growth of 115,000 (End FY 84 to 89) was held to growth of 46,000, a force reduction of 69,000.
  - Active manyears and funding reduced by an average of 44,600 manyears per year.
  - Most of the growth programed to fill out units, strengthen training base, expand maintenance capabilities and improve vital support functions.
  - Reductions of this magnitude significantly slowed these programed improvements.
- Over the same period programed reserve end strength growth of 171,000 (61,000 full time and 110,000 drilling reservists) was held to growth of 162,000 (a net of 29,000 decrease in full-time support and 20,000 increase in drilling reservists).
  - Manyears and funding for full-time support personnel decreased an average of 20,000 per year while drilling reserves decreased an average of 7,700 per year.
  - As a result, many reserve units remain undermanned and planned readiness improvements in training, administration and support have been slowed.
- Permanent Change of Station (PCS) travel has been reduced an average of $300 million per year.
  - Reflects denial of needed improvements to adequately reimburse members for government directed moves.

O&M
Revised Funding
FY 85 FYDP VS FY 88/89 FYDP

The O&M funding decrease between the FY 1985 FYDP and the FY 1988/FY 1989 FYDP is primarily in force operations and Central Supply and Maintenance as follows:

- Army has slowed the tempo of operations of ground forces, curtailed off-post force exercises, and reduced the growth in force modernization support. Planned increases in Army air crew flying hour rates have been cut back.
- Army has also reduced the level of real property maintenance (backlogs will increase rather than decrease) and planned improvements in base operating support, including quality of life programs for military personnel and their families.
- Navy has altered ship operations partially to reduce cost by increasing in port time. Reductions in the rate of buildup in naval ships has slowed the growth in O&M funding.
- The planned number of Air Force tactical fighter air wings has dropped from 40 to 37. Air Force has also cut its level of real property maintenance and base operating support.
- Repair cycles for depot equipment maintenance have been extended so less equipment will be available to field commanders to accomplish necessary training. Decreased equipment modernization efforts will decrease equipment capability and increase the cost of future maintenance. Delaying improvements in technical data will mean equipment maintenance efforts will take longer and be more expensive.
- ADP purchase and other efficiency investments efforts have been stretched out. Potential savings and efficiencies have been deferred.
- Planned care of supplies in storage and warehousing efforts have been deferred. The time and cost of bringing deteriorated equipment and supplies to a usable condition will increase. A lack of warehousing efforts will degrade inventory accuracy.

Program Loss FY 1985-FY 1989
Procurement Title

Procurement funding for the period FY 1985-FY 1989 has dropped by $170.4 billion since FY 1985. The reductions have occurred in the following areas:

Program	(Dollars in Billions)
Major Systems	80.0
Ammunition	17.7
Communications & Electronics	17.7
Aircraft Spares	16.7
Aircraft Modifications	12.7
Vehicles	4.6
Ship Modifications	4.6
Other	16.3
Total	170.3

These reductions are discussed in more detail below.

Major Systems -80.0B

-Tactical aircraft down by 450.

-Training aircraft down by 497.

-Tracked Combat Vehicles lower by 1,840.

-Air Force missiles are 76,991 lower than planned.

-Army missiles are 41,065 lower.

-Navy missiles/torpedoes down by 46,904.

Ammunition -17.7B

-Sustainability goals delayed 3 to 4 years.

-Reliance on less effective munitions.

Communications And Electronics -17.7B

-Retention of older tactical communications systems that breakdown more often, are harder to fix, are more easily jammed and do not provide all of the data that is required.

Aircraft Spares -16.7B

-Spare parts reductions result in shortfalls in wartime aircraft parts, reduced support for shore and afloat sites and decreases in tactical air force sustainability.

Aircraft Modification	-12.7B

-Slows modernization of KC-135 tankers, fighter aircraft and Army helicopters.

-Increased risk that missions cannot be performed, aircraft will be lost and safety of pilots and aircraft personel will be compromised.

Vehicles	-4.6B

-Increased maintenance costs and downtime.

-Lower unit capability and readiness.

Ship Modifications	-4.6B

-Reductions require the operation of ships with less capable fire control systems, hull equipment, countermeasure equipment and propulsion plants.

-Ships are less capable of detecting submarines and incoming missiles; and less capable of steaming long hours at high speeds to respond to an emergency.

Other	-16.3B

-Reductions in such equipments as bomb racks; training range equipment; diagnostic equipment; missile modifications; calibration equipment; and radars, sonars and other equipment to modernize ships.

-Support equipment to deploy weapons are not being provided on time.

-Wartime readiness is reduced, training is limited and maintenance costs rise.

Major Procurements
FY 1985 Plan vs. Enacted/Budget Request

Program	FY 1985 Qty	FY 1986 Qty	FY 1987 Qty	FY 1988 Qty	FY 1989 Qty
Army					
AH-64					
Plan	144	144	56	-	-
Enacted/Request	144	144	120	67	-
Difference	-	-	+64	+67	-
UH-60/EH-60					
Plan	96	96	96	96	96
Enacted/Request	104	98	100	61	77
Difference	+8	+2	+4	-35	-19
C-12					
Plan	-	-	-	-	12
Enacted/Request	12	6	-	-	-
Difference	+12	+6	-	-	-12
Cessna Skylane					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	2	-
Difference	-	-	-	+2	-
RC-12D					
Plan	9	-	-	6	6
Enacted/Request	9	-	-	3	6
Difference	-	-	-	-3	-
Golden Knights					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	2	-
Difference	-	-	-	+2	-
CH-47D					
Plan	11	-	-	-	-
Enacted/Request	11	-	-	-	-
Difference	-	-	-	-	-
PATRIOT					
Plan	585	815	920	920	920
Enacted/Request	440	585	700	715	815
Difference	-145	-230	-220	-205	-105
HELLFIRE					
Plan	6,026	6,576	6,576	6,576	6,758
Enacted/Request	6,026	6,576	-	5,000	4,000
Difference	-	-	-6,576	-1,576	-2,758

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
TOW 2					
Plan	18,000	18,000	15,500	21,029	24,812
Enacted/Request	6,000	13,400	9,350	9,416	8,719
Difference	-12,000	-4,600	-6,150	-11,613	-16,093
STINGER					
Plan	2,360	6,467	6,675	8,113	7,486
Enacted/Request	2,360	3,439	4,180	4,200	5,000
Difference	-	-3,028	-2,495	-3,913	-2,486
Air Def. Sys. Heavy					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	245	709
Difference	-	-	-	+245	+709
ATACMS					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	-	66
Difference	-	-	-	-	+66
CHAPARRAL					
Plan	-	300	1,525	2,400	2,445
Enacted/Request	12	-	456	122	368
Difference	+12	-300	-1,069	-2,278	-2,077
Air-to-Air Stinger					
Plan	-	-	638	2,008	950
Enacted/Request	-	-	-	-	-
Difference	-	-	-638	-2,008	-950
MLRS					
Plan	50,472	72,000	72,000	72,000	30,510
Enacted/Request	50,472	72,000	72,000	72,000	36,000
Difference	-	-	-	-	+5,490
M-1					
Plan	720	720	720	720	720
Enacted/Request	840	840	840	600	534
Difference	+120	+120	+120	-120	-186
Bradley					
Plan	710	900	900	900	900
Enacted/Request	655	716	720	616	618
Difference	-55	-184	-180	-284	-282
M-88 Recovery Vehicle					
Plan	180	180	180	180	180
Enacted/Request	180	240	-	-	80
Difference	-	+60	-180	-180	-100

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
FAASV					
Plan	170	230	257	311	-
Enacted/Request	170	150	141	65	-
Difference	-	-80	-116	-246	-
Carrier, M577A2					
Plan	167	-	-	165	-
Enacted/Request	167	165	300	-	-
Difference	-	+165	+300	-165	-
Carrier, M113					
Plan	50	-	-	45	-
Enacted/Request	50	555	-	-	-
Difference	-	+555	-	-45	-
Howitzer, M109					
Plan	70	152	122	151	-
Enacted/Request	70	-	-	-	-
Difference	-	-152	-122	-151	-
Howitzer, M119					
Plan	-	-	-	-	-
Enacted/Request	-	-	64	113	103
Difference	-	-	+64	+113	+103
MPGS					
Plan	-	-	-	-	20
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-	-20
DIVAD					
Plan	132	144	66	-	-
Enacted/Request	-	-	-	-	-
Difference	-132	-144	-66	-	-
Howitzer, M198					
Plan	-	-	94	142	138
Enacted/Request	-	-	-	-	42
Difference	-	-	-94	-142	-96
Machine Gun, M240					
Plan	4,766	4,786	4,836	4,320	4,584
Enacted/Request	4,766	4,924	4,509	-	-
Difference	-	+138	-327	-4,320	-4,584
SAW					
Plan	3,800	6,000	6,000	6,000	6,000
Enacted/Request	3,800	-	4,800	5,400	5,670
Difference	-	-6,000	-1,200	-600	-330

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
Grenade Launcher, MK-19					
Plan	340	1,005	957	1,243	1,825
Enacted/Request	340	821	1,108	1,408	1,326
Difference	-	-184	+151	+165	-499
Launcher, Smoke Grenade					
Plan	5,526	5,752	4,761	-	-
Enacted/Request	5,526	3,177	4,217	3,628	2,949
Difference	-	-2,575	-544	+3,608	+2,949
Mortar, 81mm					
Plan	441	371	580	1,090	1,228
Enacted/Request	441	187	457	-	-
Difference	-	-184	-123	-1,090	-1,228
Mortar 120mm					
Plan	-	-	-	-	-
Enacted/Request	-	63	145	332	350
Difference	-	+63	+145	+332	+350
M16A2 Rifle					
Plan	75,000	50,000	-	-	-
Enacted/Request	75,000	71,990	76,235	60,000	60,000
Difference	-	+21,990	+76,235	+60,000	+60,000
9mm					
Plan	14,650	25,400	25,974	29,174	33,164
Enacted/Request	30,000	25,400	21,219	23,418	33,078
Difference	+15,350	-	-4,755	-5,756	-86
Bushmaster					
Plan	755	945	945	945	932
Enacted/Request	690	715	852	947	948
Difference	-65	-230	-93	+2	+16
Sniper Weapon System					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	500	500
Difference	-	-	-	+500	+500
Navy					
A-6					
Plan	6	-	-	-	-
Enacted/Request	6	11	11	12	18
Difference	-	+11	+11	+12	+18
AV-8B					
Plan	32	46	47	48	60
Enacted/Request	32	46	42	32	32
Difference	-	-	-5	-16	-28

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
F-14					
Plan	24	24	12	12	24
Enacted/Request	24	18	15	12	12
Difference	-	-6	+3	-	-12
F-18					
Plan	84	102	120	120	120
Enacted/Request	84	84	84	84	72
Difference	-	-18	-36	-36	-48
CH-53					
Plan	10	14	14	14	14
Enacted/Request	10	14	14	14	14
Difference	-	-	-	-	-
SH-60					
Plan	18	18	18	18	18
Enacted/Request	24	18	24	24	24
Difference	+6	-	+6	+6	+6
P-3					
Plan	9	9	9	9	9
Enacted/Request	9	9	9	-	-
Difference	-	-	-	-9	-9
E-2C					
Plan	6	6	6	6	6
Enacted/Request	6	6	10	6	6
Difference	-	-	+4	-	-
C-2					
Plan	8	8	9	-	-
Enacted/Request	8	8	9	-	-
Difference	-	-	-	-	-
E-6A					
Plan	-	3	3	3	3
Enacted/Request	-	2	3	3	7
Difference	-	-1	-	-	+4
EA-6B					
Plan	6	6	6	6	6
Enacted/Request	6	12	12	6	9
Difference	-	+6	+6	-	+3
AH-1T/W					
Plan	22	22	-	-	-
Enacted/Request	22	22	-	-	-
Difference	-	-	-	+22	+12

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
JVX					
Plan	-	-	-	-	18
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-	-18
RP-3D					
Plan	-	-	-	1	1
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-1	-1
SH-2F					
Plan	6	-	-	-	-
Enacted/Request	6	6	6	-	-
Difference	-	+6	+6	-	-
UC-12B					
Plan	12	24	12	-	-
Enacted/Request	12	12	-	-	-
Difference	-	-12	-12	-	-
T-34C					
Plan	-	114	-	-	-
Enacted/Request	-	19	-	-	-
Difference	-	-95	-	-	-
T-45TS					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	12	24
Difference	-	-	-	+12	+24
T-44A					
Plan	-	-	15	-	-
Enacted/Request	-	-	-	-	-
Difference	-	-	-15	-	-
EX Competition					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	8	8
Difference	-	-	-	+8	+8
Adversary					
Plan	8	12	-	-	-
Enacted/Request	10	12	-	-	-
Difference	+2	-	-	-	-
VH-60					
Plan	-	-	-	-	-
Enacted/Request	-	+9	-	-	-
Difference	-	+9	-	-	-

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
VTXTS					
Plan	-	-	-	8	24
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-8	-24
TH-57					
Plan	36	-	-	-	-
Enacted/Request	36	-	-	-	-
Difference	-	-	-	-	-
C-20A					
Plan	-	-	-	-	-
Enacted/Request	-	2	-	-	-
Difference	-	+2	-	-	-
SPARROW					
Plan	1,250	1,692	1,862	1,340	483
Enacted/Request	1,495	1,948	1,716	-	-
Difference	+245	+256	-142	-1,340	-483
SIDEWINDER					
Plan	1,000	1,220	1,168	1,168	600
Enacted/Request	1,000	2,120	350	288	-
Difference	-	+900	-818	-880	-600
PHOENIX					
Plan	400	567	567	567	567
Enacted/Request	265	265	205	430	560
Difference	-135	-302	-362	-137	-7
HARPOON					
Plan	354	360	290	283	179
Enacted/Request	354	395	94	124	138
Difference	-	+35	-196	-159	-41
Standard					
Plan	1,380	2,430	2,925	2,665	3,195
Enacted/Request	1,330	1,316	1,194	1,150	1,635
Difference	-50	-1,114	-1,731	-1,515	-1,560
Laser Maverick					
Plan	600	1,500	1,800	1,206	-
Enacted/Request	600	1,500	1,500	1,099	-
Difference	-	-	-300	-107	-
Trident II					
Plan	-	-	27	72	72
Enacted/Request	-	-	21	66	66
Difference	-	-	-6	-6	-6

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
TOMAHAWK					
Plan	180	180	190	442	636
Enacted/Request	180	249	324	475	510
Difference	-	+69	+134	+33	-126
AMRAAM					
Plan	-	-	-	600	1,100
Enacted/Request	-	-	-	-	50
Difference	-	-	-	-600	-1,050
HARM					
Plan	803	779	997	1,435	1,424
Enacted/Request	700	825	1,110	766	1,766
Difference	-103	+46	+113	-669	+342
RAM					
Plan	30	135	400	460	460
Enacted/Request	30	-	50	240	260
Difference	-	-135	-350	-220	-200
Sidearm					
Plan	-	151	179	155	-
Enacted/Request	-	373	256	276	269
Difference	-	+222	+77	+121	+269
STINGER					
Plan	-	-	-	-	-
Enacted/Request	-	-	685	425	-
Difference	-	-	+685	+425	-
Penguin					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	-	64
Difference	-	-	-	-	+64
Hellfire					
Plan	438	1,304	1,384	2,426	2,376
Enacted/Request	438	1,304	-	1,393	1,410
Difference	-	-	-1,384	-1,033	-966
IIR Maverick					
Plan	190	200	200	200	200
Enacted/Request	-	195	245	601	731
Difference	-190	-5	+45	+401	+531
MK-48/ADCAP					
Plan	167	240	344	480	480
Enacted/Request	152	123	50	100	350
Difference	-15	-117	-294	-380	-130

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
MK-46 Torpedo					
Plan	1,565	1,521	900	288	-
Enacted/Request	1,565	500	500	-	-
Difference	-	-1,021	-400	-288	-
MK-50 Torpedo					
Plan	-	-	84	352	504
Enacted/Request	-	-	39	153	224
Difference	-	-	-45	-199	-280
MK-60 CAPTOR					
Plan	300	-	-	-	-
Enacted/Request	300	150	-	-	-
Difference	-	+150	-	-	-
ASWSOW					
Plan	-	-	-	15	176
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-15	-176
MK-30 Target					
Plan	6	6	6	6	6
Enacted/Request	6	6	-	12	-
Difference	-	-	-6	+6	-6
EMATT					
Plan	-	1,200	1,984	2,960	3,473
Enacted/Request	-	-	-	-	-
Difference	-	-1,200	-1,984	-2,960	-3,473
MK-38 Mobile Target					
Plan	1,200	1,200	1,200	1,200	1,200
Enacted/Request	1,200	1,200	-	-	-
Difference	-	-	-1,200	-1,200	1,200
VLA					
Plan	-	-	200	391	520
Enacted/Request	-	-	200	260	340
Difference	-	-	-	-131	-180
Trident Submarine					
Plan	1	1	1	1	1
Enacted/Request	1	1	1	1	1
Difference	-	-	-	-	-
SSN-688					
Plan	4	4	4	4	4
Enacted/Request	4	4	4	3	2
Difference	-	-	-	-1	-2

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
CG-47					
Plan	3	3	3	2	2
Enacted/Request	3	3	3	2	2
Difference	-	-	-	-	-
DDG-51					
Plan	1	-	3	5	5
Enacted/Request	1	-	2	3	3
Difference	-	-	-1	-2	-2
LSD-41 Variant					
Plan	2	2	2	-	-
Enacted/Request	2	2	-	-	-
Difference	-	-	-2	-	-
Mine Ships					
Plan	4	8	5	4	4
Enacted/Request	4	6	4	3	2
Difference	-	-2	-1	-1	-2
TAK					
Plan	1	-	-	-	-
Enacted/Request	-	-	-	-	-
Difference	-1	-	-	-	-
SSN-21					
Plan	-	-	-	-	1
Enacted/Request	-	-	-	-	1
Difference	-	-	-	-	-
MTSD					
Plan	-	-	-	-	-
Enacted/Request	-	1	-	-	-
Difference	-	+1	-	-	-
CV SLEP					
Plan	1	-	1	-	-
Enacted/Request	1	-	-	1	-
Difference	-	-	-1	+1	-
LHD-1					
Plan	-	1	-	1	1
Enacted/Request	-	1	-	1	1
Difference	-	-	-	-	-
LPD-4					
Plan	-	-	1	3	3
Enacted/Request	-	-	-	-	-
Difference	-	-	-1	-3	-3

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
LPDX					
Plan	-	-	-	2	2
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-2	-2
AR					
Plan	-	-	-	-	1
Enacted/Request	-	-	-	-	-
Difference	-	-	-	-	-1
TAO					
Plan	3	3	3	3	2
Enacted/Request	3	2	2	2	2
Difference	-	-1	-1	-1	-
AO					
Plan	-	-	-	1	2
Enacted/Request	-	-	1	1	2
Difference	-	-	+1	-	-
TAGOS					
Plan	3	3	-	-	-
Enacted/Request	2	2	3	-	3
Difference	-1	-1	+3	-	+3
AE					
Plan	-	1	1	1	1
Enacted/Request	-	-	-	-	-
Difference	-	-1	-1	-1	-1
AOE					
Plan	-	1	-	1	1
Enacted/Requested	-	-	1	-	1
Difference	-	-1	+1	-1	-
AG					
Plan	-	1	-	-	-
Enacted/Request	-	1	1	-	1
Defference	-	-	+1	-	+1
TAGS					
Plan	2	-	-	-	-
Enacted/Request	2	-	-	-	-
Difference	-	-	-	-	-
LCAC					
Plan	9	12	12	12	12
Enacted/Request	9	12	-	-	9
Difference	-	-	-12	-12	-3

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
TACS					
Plan	2	-	-	-	-
Enacted/Request	2	3	2	2	2
Difference	-	+3	+2	+2	+2
TAVB					
Plan	1	1	-	-	-
Enacted/Request	1	1	-	-	-
Differences	-	-	-	-	-
LVT7A1					
Plan	4	-	-	-	-
Enacted/Request	4	-	-	-	-
Differences	-	-	-	-	-
LVT7 SLEP					
Plan	240	-	-	-	-
Enacted/Request	240	-	-	-	-
Difference	-	-	-	-	-
LAV					
Plan	292	-	-	-	-
Enacted/Request	292	-	-	-	-
Differences	-	-	-	-	-
M88					
Plan	5	5	-	-	-
Enacted/Request	5	5	-	-	-
Difference	-	-	-	-	-
M-1 Tank					
Plan	-	-	1	50	108
Enacted/Request	-	-	-	-	66
Difference	-	-	-1	-50	-42
Howitzer, M198					
Plan	-	52	86	-	-
Enacted/Request	-	47	94	-	-
Difference	-	-5	+8	-	-
HAWK (MC)					
Plan	500	482	540	1,280	848
Enacted/Request	500	550	430	525	526
Difference	-	+68	-110	-755	-322
Stinger (MC)					
Plan	800	2,055	2,293	3,678	3,847
Enacted/Request	700	800	1,442	3,067	3,115
Difference	-100	-1,255	-851	-611	-732

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
TOW (MC)					
Plan	3,822	4,014	6,515	6,725	6,933
Enacted/Request	3,822	4,241	3,400	2,680	2,585
Difference	-	+227	-3,115	-4,045	-4,348
Air Force					
B-1					
Plan	34	43	-	-	-
Enacted/Request	34	48	-	-	-
Difference	-	+5	-	-	-
F-15					
Plan	48	60	72	96	96
Enacted/Request	42	48	42	42	42
Difference	-6	-12	-30	-54	-54
F-16					
Plan	150	216	216	216	216
Enacted/Request	150	180	180	180	180
Difference	-	-36	-36	-36	-36
KC-10					
Plan	8	12	8	-	-
Enacted/Request	8	12	8	-	-
Difference	-	-	-	-	-
C-5B					
Plan	10	16	19	-	-
Enacted/Request	8	16	21	-	-
Difference	-2	-	+2	-	-
TR-1					
Plan	4	1	-	-	-
Enacted/Request	4	6	3	-	-
Difference	-	+5	+3	-	-
MC-130H					
Plan	2	4	4	4	4
Enacted/Request	2	1	5	7	4
Difference	-	-3	+1	+3	-
C-130H					
Plan	-	-	-	-	-
Enacted/Request	16	-	-	5	6
Difference	+16	-	-	+5	+6
C-17					
Plan	-	-	-	2	4
Enacted/Request	-	-	-	2	4
Difference	-	-	-	-	-

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
C-20A					
Plan	3	3	3	2	-
Enacted/Request	3	8	-	-	-
Difference	-	+5	-3	-2	-
Air Defense Competition					
Plan	-	-	-	-	-
Enacted/Request	-	-	20	-	-
Difference	-	-	+20	-	-
Flight Inspec. Aircraft					
Plan	-	-	1	3	3
Enacted/Request	1	-	-	-	-
Difference	+1	-	-1	-3	-3
T-46A					
Plan	10	33	99	144	144
Enacted/Request	10	33	-	-	-
Difference	-	-	-99	-144	-144
C-27					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	5	5
Difference	-	-	-	+5	+5
Air Force One					
Plan	-	-	-	-	-
Enacted/Request	-	2	-	-	-
Difference	-	+2	-	-	-
HH-60D/E					
Plan	-	3	25	35	48
Enacted/Request	-	3	-	-	-
Difference	-	-	-25	-35	-48
AC-130H					
Plan	-	-	-	-	-
Enacted/Request	-	1	-	-	-
Difference	-	+1	-	-	-
Range Ctrl. Acft					
Plan	2	-	-	-	-
Enacted/Request	2	-	-	-	-
Difference	-	-	-	-	-
PEACEKEEPER					
Plan	40	48	48	48	48
Enacted/Request	-	12	12	21	21
Difference	-40	-36	-36	-27	-27

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
MAVERICK (65D)					
Plan	4,500	8,000	12,000	12,000	12,000
Enacted/Request	2,600	2,950	2,755	2,100	1,900
Difference	-1,900	-5,050	-9,245	-9,900	-10,100
HARM					
Plan	871	1,682	2,278	2,326	1,660
Enacted/Request	871	1,450	1,655	1,748	893
Difference	-	-232	-623	-578	-767
GLCM					
Plan	120	120	51	-	-
Enacted/Request	120	95	76	37	-
Difference	-	-25	+25	+37	-
GBU-15					
Plan	-	65	260	800	2,200
Enacted/Request	-	40	51	121	235
Difference	-	-25	-209	-679	-1,965
Harpoon					
Plan	85	-	-	-	-
Enacted/Request	85	-	-	-	-
Difference	-	-	-	-	-
AMRAAM					
Plan	174	1,042	1,944	2,400	1,800
Enacted/Request	20	-	180	630	1,750
Difference	-154	-1,042	-1,764	-1,770	-50
Defense Support Program					
Plan	-	-	1	1	-
Enacted/Request	-	-	-	1	2
Difference	-	-	-1	-	+2
Stinger					
Plan	156	-	-	-	-
Enacted/Request	156	-	-	-	-
Difference	-	-	-	-	-
Tactical Drones					
Plan	505	-	-	-	-
Enacted/Request	-	-	-	48	58
Difference	-505	-	-	+48	+58
SPARROW					
Plan	-	-	-	-	-
Enacted/Request	-	497	379	558	-
Difference	-	+497	+379	+558	-

Program	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
Sidewinder					
Plan	-	-	-	-	-
Enacted/Request	-	1,650	550	956	760
Difference	-	+1,650	+550	+956	+760
DSCS					
Plan	2	2	2	1	-
Enacted/Request	2	2	2	1	-
Difference	-	-	-	-	-
AF Sat Comm					
Plan	-	1	1	-	-
Enacted/Request	-	1	-	-	-
Difference	-	-	-1	-	-
CELV					
Plan	-	-	-	-	-
Enacted/Request	-	1	1	9	3
Difference	-	+1	-1	+9	+3
Global Positioning					
Plan	6	9	8	4	-
Enacted/Request	6	9	8	4	-
Difference	-	-	-	-	-
Space Defense Sys					
Plan	3	5	10	18	22
Enacted/Request	-	-	-	-	-
Difference	-3	-5	-10	-18	-22
Medium Launch Sys					
Plan	-	-	-	-	-
Enacted/Request	-	-	-	4	4
Difference	-	-	-	+4	+4

Impact of Reduction to FY 1985 Plan
Research, Development, Test and Evaluation

- Technology base program to provide long-term weapon qualitative superiority reduced to no real growth
- Strategic Defense Initiative program reduced; program options reduced
- Army Tactical Programs (155 SP Howitzer Improvement Program, Anti-Tactical Missile, Remotely Piloted Vehicles) reduced
- Mobile Protected Gun and High Technology Light Division programs cancelled
- Army's Lightweight Air Defense System deferred
- Navy Strategic Programs (TRIDENT II, SSBN Conversion) reduced
- Naval Air Warfare Programs (F-18, F-14, T-45, V-22, Aircraft Engine Component Improvements, Air-to-Air Missile Systems, Lift Fan Development) reduced
- Naval Anti-Submarine Warfare Programs (SSN-688 Combat System, Submarine Sonar Development, DDG-51, SSN-21, Surface ASW) reduced
- Air Force Strategic Programs (Airborne Command Post, Advanced Strategic Missile System, SRAM II Missile, ICBM Modernization) reduced
- B-1B Bomber and ASAT programs increased
- National Aerospace Plane increased
- Air Force Tactical Programs (C-17 Airlift Aircraft, Advanced Tactical Fighter, JSTARS) increased
- Air Force Special Operations Forces increased
- DARPA and DNA programs reduced

RDT&E FYDP Program

FY 1985 Plan vs. FY 1988/1989 Request

	($ in Millions)				
	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
January 1984 FYDP	34,015	37,907	38,617	43,990	47,457
Enacted Program	31,327	33,609	35,994	--	--
FY 1988/FY 1989 Request	--	--	--	43,749	44,287
Reduction from 1/84 FYDP	-2,688	-4,298	-2,623	-241	-3,170
Inflation	(-519)	(-1,273)	(-1,521)	(-1,495)	(-2,161)
Program	(-2,169)	(-3,025)	(-1,102)	(+1,254)	(-1,009)
Analysis of Program Changes					
Research & Exploratory Dev	-60	-311	-575	-667	-762
Technology Demonstrations	-605	-1,360	-1,185	-831	-811
Strategic Programs	-437	-218	+622	+898	-167
Tactical Programs	-855	-1,234	-887	+1,670	+1,760
C^3 and Intelligence	-201	+49	+822	+1,301	+1,180
R&D Program Support	-11	+49	+101	-1,117	-2,209
Total	-2,169	-3,025	-1,102	+1,254	-1,009

RDT&E FYDP Program

FY 1985 Plan vs. FY 1988/1989 Request

Major Programs	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
Army					
155 SP Howitzer Imp	+1	-1	-37	-81	-174
Anti-Tactical Missile	-60	-30	-39	-15	+28
Lightweight Air Defense Sys	--	-4	-7	-115	-157
Mobile Protected Gun	--	-15	-101	-163	-171
ALHX --	--	-197	-54	+59	
RPV's (AQUILA)	-4	+47	+42	-24	-140
Tactical Elec CM	-29	-28	-37	-65	-64
High Technology Light Div	-56	-59	-68	-67	-24
Program-Wide Activities	-18	-30	-113	-115	-108
Forward Area Air Defense	--	+40	+74	+116	+141
All Other	-431	-508	-485	-200	-563
	(-597)	(-588)	(-968)	(-783)	(-1173)
Navy					
TRIDENT II Missile	-51	-205	-171	-252	-120
F-18 Fighter	+10	+1	-28	-64	-62
F-14 Fighter	-13	-169	-29	+32	+43
T-45 Trainer	-42	-131	-220	-235	-29
V-22 Tilt Rotor Aircraft	-23	-72	-51	+82	+92
A/C Engine Component Imp	-10	-43	-62	-76	-75
Air-to-Air Missile Systems	-2	+3	-14	+3	+26
SUBACS	-1	-20	+6	+103	+130
Ship Subsystems LBTS	-15	-18	-60	-181	-192
Navy C^2 System	-17	-24	-57	-46	-45
Lift Fan Development	--	--	--	-54	-55
Submarine Sonar Dev	-16	-69	-107	-134	-67
DDG-51	-5	-42	-37	-59	-90
U.S.M.C. Assault Vehicles	-3	-42	-64	-58	-78
Classified Programs	--	--	--	+298	+476
SSN-21	+3	+10	-23	-35	-50
Manufacturing Technology	-18	-47	-64	-53	-52
SS( )N --	--	--	-99	-244	
Surface ASW	-4	-1	42	-51	-59
All Other	-399	-846	-355	-9	-869
	(-606)	(-1,715)	(-1,378)	(-888)	(-1,310)
Air Force					
Airborne Command Post	--	+5	+7	-12	-162
Minuteman Squadrons	--	-25	-8	+45	+116
Adv Strategic Missile Sys	-7	-25	-21	-119	-252
SRAM II Missile	-40	-89	-89	-27	+56
B-1B Bomber	-37	-109	-19	+339	+329
ICBM Modernization	-232	-141	-21	-217	-226
ASAT	+55	+41	+130	+314	+311
ATF	-2	-86	-9	+183	+89
C-17 Airlift Aircraft	-7	-5	+228	+112	+128
A/C Engine Component Imp	-4	-47	-34	-40	-17
JSTARS	-46	+57	+207	+245	+164
Space Shuttle	-27	-11	-34	-30	-47
Space Shuttle Operations	-10	-44	-77	-147	-99

RDT&E FYDP Program

FY 1985 Plan vs. FY 1988/1989 Request

Major Programs Air Force (Continued)	FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
Test & Evaluation Support	-10	-33	-140	-131	-124
Classified Programs	-277	+632	+613	+1,155	+50
Modular Stand off Weapon	--	--	--	+34	+33
F-111 Self Protection Sys	--	--	--	+51	+45
AWACS	+11	+6	+9	+53	+37
Intelligence and Comm	-131	--	+446	+389	+290
VHSIC	+13	+85	+57	+60	+35
National Aerospace Plane	--	--	--	+207	+260
Special Operations Forces	--	+8	+65	+96	+96
All Other	+267	-432	+1,092	+521	+329
	(-484)	(-213)	(+2,042)	(+3,081)	(+1,441)
Defense Agencies					
Defense Mapping Agency	-3	-24	+4	+113	+138
SDIO	-345	-948	-969	-704	-699
DARPA	-63	-159	-153	-204	-226
Defense Nuclear Agency	-9	-30	-81	-57	-50
DT&E	-2	+41	+65	+74	+83
OT&E	--	--	+52	+91	+127
All Other	-59	+611	-75	+531	+660
	(-481)	(-509)	(-1,157)	(-156	(+33)

Impact of Reduction to FY 1985 Plan
Military Construction

o Program Loss exceeds $20 billion after correction for Inflation:

($ in Millions)

FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
1,530	4,310	4,804	4,304	5,165

o Funds remaining are only 62% of those identified in FY 1985 as required to adequately meet mission, quality-of-life, and routine replacement requirements.

o In large part, critical mission-related construction for new weapon systems, force realignments, and changing missions have been minimally satisfied.

o Quality-of-life facilities have been adversely impacted. These facilities have become increasingly essential due to the changed nature of the military, increased number of women, and changes in societal expectations. They are essential to retain highly qualified personnel.

o The reductions have adversely impacted the replenishment of our physical plant. A minimum of 2% replacement per year is required to maintain our facilities at the current level. We have fallen further and further behind each year.

o Many functions are still being accomplished in "temporary" World War II wooden structures.

o Production lines and utility systems have not been upgraded.

o Standard requirements for space and access for the handicapped are not being met.

o Large portions of the Defense infrastructure still consist of dysfunctional, deteriorating facilities that are expensive to maintain, inefficient in meeting mission requirements, and unpleasant to work in.

o These requirements have been deferred, but they must inevitably be satisfied, usually at a greatly increased cost.

Impact of Reduction to FY 1985 Plan
Family Housing

- Program Loss exceeds $3.5 billion after correction for Inflation:

($ in Millions)

FY 1985	FY 1986	FY 1987	FY 1988	FY 1989
216	848	855	725	871

- Funds provided are only 83% of those identified in FY 1985 as required to adequately meet requirements.
- The Department owns or leases more than 400,000 housing units whose utilities, lease payments, and routine maintenance must be paid.
- Program reductions have been taken from areas where some discretion for deferral exists, such as new construction, improvements, and major maintenance.
- The Defense housing deficit has continued to grow, forcing servicemembers and their families to live in substandard crowded units, often at a considerable distance from their base.
- Caps on housing allowances have served to increase the gap between what is available in the community and what our servicemembers can afford.
- Application of just one-third of the funds eliminated from the budget to new construction would have resulted in approximately 15,000 new units.
- The housing inventory is aging rapidly, creating increasing demands for modernization of kitchens, bathrooms, etc. Reduced funding levels have prevented required upgrading except in a small percentage of cases.
- The backlog of required maintenance and repair has increased.
- Improvement and maintenance can be deferred, but they cannot be postponed indefinitely.

I am still trying to get back to this funded recruiting effort that we have here. We will finish with this, and then we can go on to those other factors.

CHART 15

FY 1988/FY 1989 DoD BUDGET

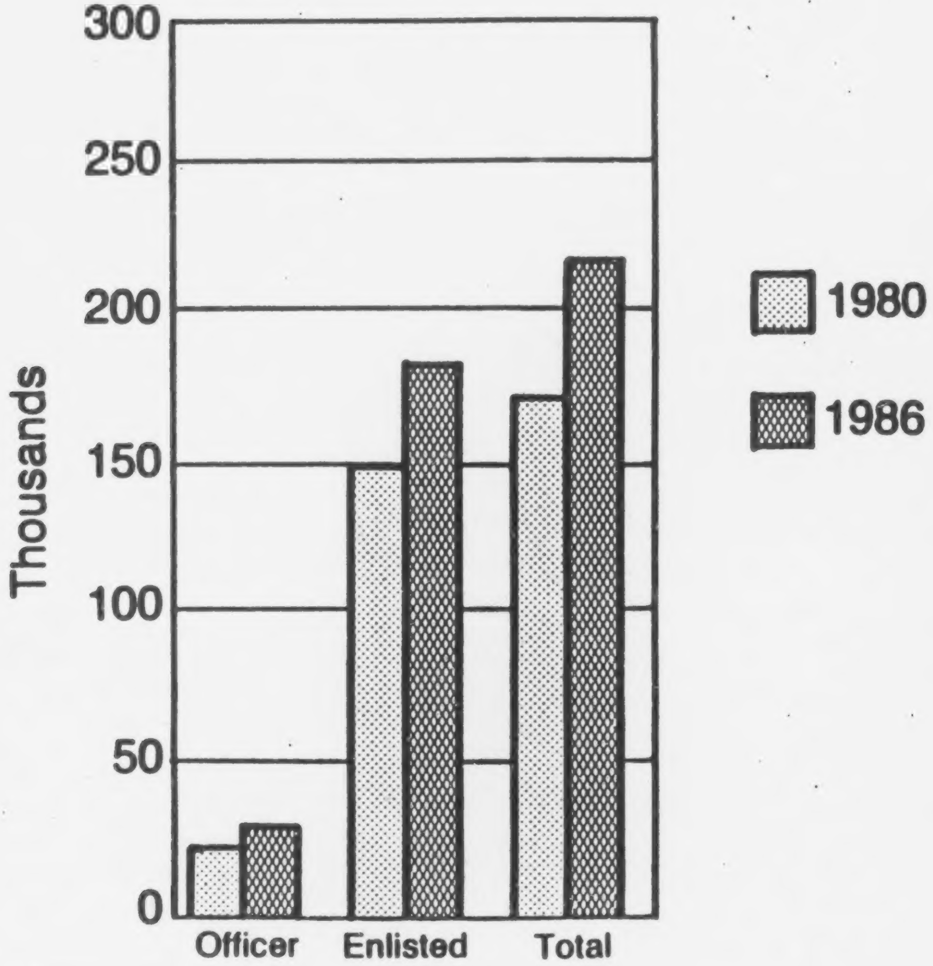
Military Personnel Indicators

	1980	1982	1985	1986
Recruiting Quality				
High School Graduates	68%	86%	93%	92%
Mental Categories I thru III	69%	87%	93%	96%
Retention				
Reenlistments - All Regulars	55%	68%	64%	65%
First Term Reenlistments	38%	53%	48%	49%
Career Reenlistments	70%	85%	84%	84%

But as you see, high school graduates in 1980 were only 68 percent; they are now 92 percent of the force. In achievement tests, we are getting 96 percent in Grades I through III. We have 65 percent re-enlistment. Our career re-enlistment is 84 percent; our first-term reenlistment is 49 percent, all tremendous increases since 1980.

CHART 16

WOMEN IN THE MILITARY
(Thousands)



WOMEN IN MILITARY INCREASING

The next one, we have made great progress in increasing the number of women in the military. This is as it should be, and we continue to work on this, both officer and enlisted. We are now well over two hundred thousand total, which is good progress but we continue to want more, and we are getting a great many very fine volunteers.

CHART 17

FY 1988/FY 1989 DoD BUDGET

MANPOWER

(END STRENGTH IN THOUSANDS)

	FY 1986	Delta	FY 1987	Delta	FY 1988	Delta	FY 1989
ACTIVE DUTY							
ARMY	781	0	781	0	781	0	781
NAVY	581	+6	587	+6	593	+10	603
MARINE CORPS	199	+1	200	0	200	0	200
AIR FORCE	608	-1	607	-8	599	+2	601
TOTAL MILITARY 1/	2,169	+5	2,174	-2	2,172	+12	2,184
RESERVES							
SELECTED RESERVES	1,130	+27	1,157	+33	1,190	+23	1,213
CIVILIANS							
TOTAL CIVILIAN 2/	1,112	+12	1,124	-1	1,123	+2	1,125

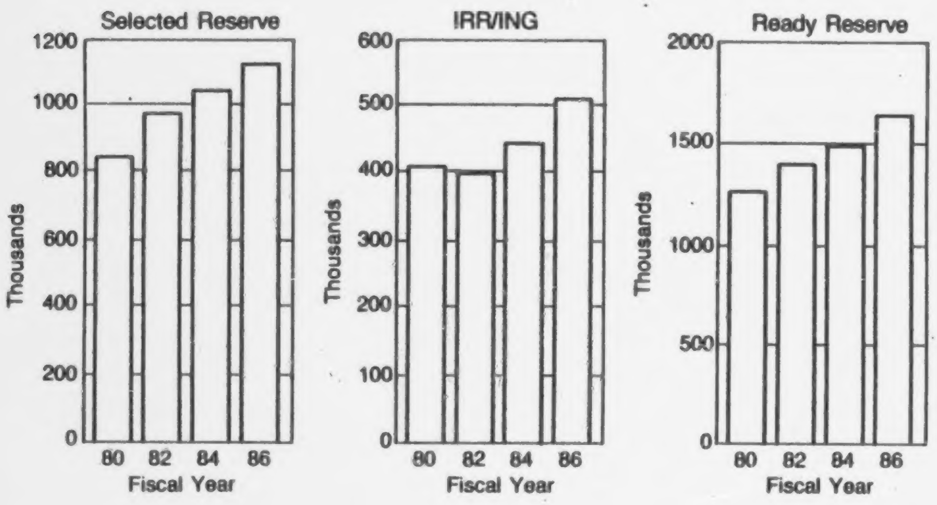
Note: 1. Includes Military assigned to Defense Agencies and Cadets.
2. Civilian End Strength includes Classified, Wage Board, Foreign Indirect, Civilian Technicians, and Permanent Part-time.

End strength force, this shows that the end strengths is relatively level. There is an increase in the Navy because of more ships coming on line. The Marine Corps is level, Army is level, and a small increase in the Air Force after a decrease in the first of the two years before you. Reserves are going up extremely well. We have had very good success with the recruiting program there. The civilian employment is just about level over the years.

CHART 18

RESERVE COMPONENT MANPOWER GROWTH

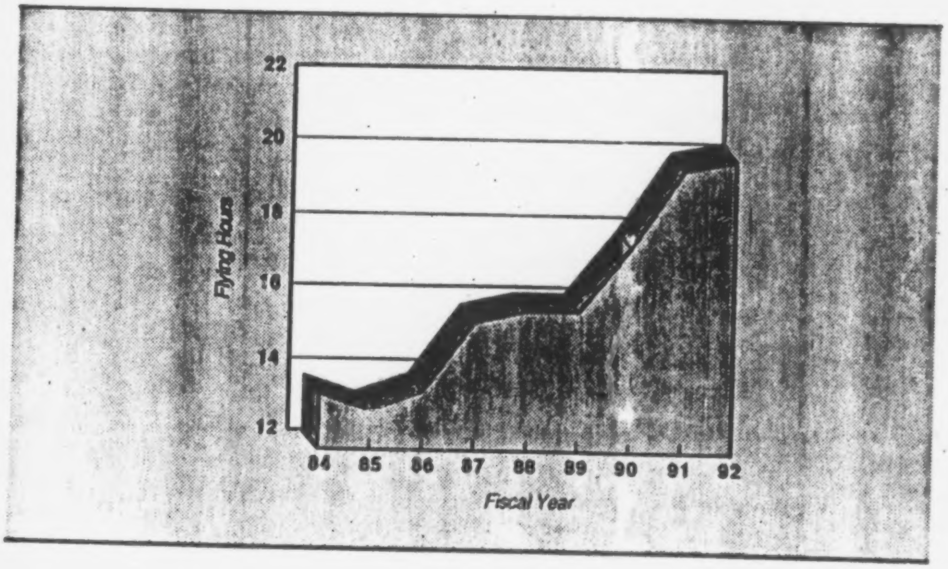
(Thousands)



Here is another one that just restates that, the growth of the reserve and the ready reserve, and we will move along to the next one to save time.

CHART 19

MONTHLY FLYING HOURS PER CREW
(Active Army Forces)

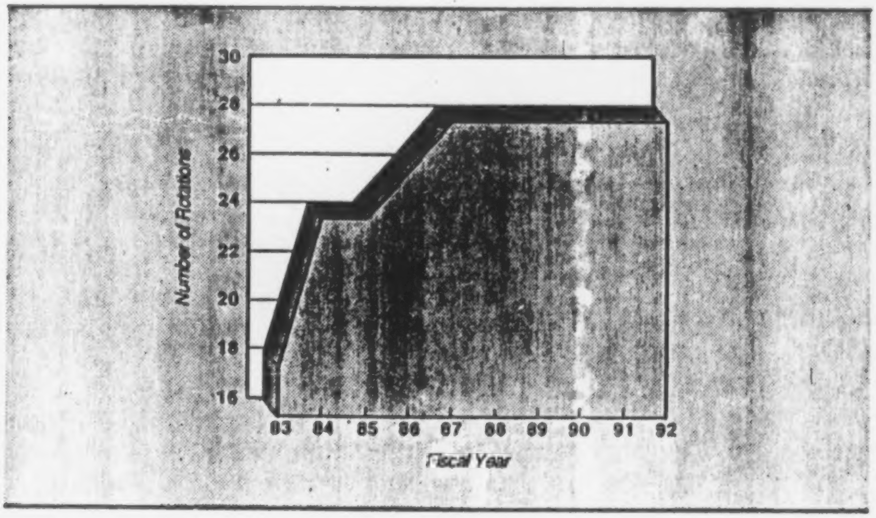


Here is one of the ways in which we have increased readiness. This is a substantial increase in monthly flying hours per air crew, and this is a very important way to measure readiness.

CHART 20

BATTALION ROTATIONS THROUGH THE NATIONAL TRAINING CENTER

(Active and Reserve Army Forces)



Here is another important measure of readiness. We have increased the number of battalions that we can rotate through the National Training Center in California.

CHART 21

LAND FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
	FY 1980	FY 1986			
Close Combat:					
M-1 Tanks	34	3,539	5,753	600	600
Bradley Fighting Vehicles	0	2,555	4,351	616	618
Helicopters:					
AH-64 Apache	0	165	526	67	-
UH-60 Blackhawk	0	740	859	61	72
Missiles:					
Patriot	0	1,038	1,790	715	815
Stinger	0	11,836	26,763	7,692	8,115
TOW-2	0	49,741	94,661	12,096	11,304
MLRS	0	80,856	260,322	72,000	36,000

MODERNIZATION OF FORCES

Here are some of the things we have acquired since 1980. These are some of the ways in which the money has been spent, Mr. Chairman, and some of the things that we have added. As you see, we have increased substantially the number of tanks, from 34 in 1980 to 5,753 now including the ones in the pipeline, and that is the most modern tank, the M–1. The same with the Bradley Vehicles, from zero to 4,351; with the new helicopters from zero to 859, from zero to 526. All the missiles, all of these have gone up very substantially in the years.

This is one of the things the money went for, and it is a very major addition, as you mentioned, Mr. Chairman, in your opening statement.

CHART 22

NAVAL FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/ Pipeline		
	FY 1980	FY 1986		FY 1988	FY 1989
SHIPS:					
TRIDENT	0	8	14	1	1
SSN 688 Submarine	10	34	56	3	2
CG-47 Cruiser	0	5	22	2	2
SSN-21	0	0	0	0	1
DDG-51 Destroyer	0	0	3	3	3
AIRCRAFT:					
CH-53/MH-53E	0	75	113	14	14
SH-60B/F	0	63	129	24	24

Naval forces modernization shows the same kind of thing: 8 Trident submarines have been traded through fiscal year 1987, 7 Trident submarines are currently operational, and an eighth is on sea trial; 56 of the Los Angeles class, as opposed to ten when we got here; 22 of the cruisers on hand or in the pipeline, and the other figures there before you.

CHART 23

NAVAL FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/ Pipeline		
	FY 1980	FY 1986		FY 1988	FY 1989
MISSILES/WEAPONS:					
Tomahawk	0	350	991	475	510
Harpoon	609	1,903	2,573	124	138
MK-48 ADCAP	0	0	197	100	350
MK-50	0	0	39	153	224
TRIDENT II	0	0	21	66	66

These are the naval weapons systems, again, that show major increases, and we present all of these to you as indications of not only the way that funding has been spent, but of the additions that are requested in 1988 and 1989 to keep us current. It also shows one of the advantages of 2-year budgeting.

CHART 24

TACTICAL AIR FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
	FY 1980	FY 1986			
COMBAT AIRCRAFT					
F-14	264	455	512	12	12
F-15	501	749	877	42	42
F-16	143	972	1,468	180	180
F/A-18	2	323	567	84	72
AV-8B	0	59	174	32	32
MOBILITY AIRCRAFT					
C-17	0	0	0	2	4

There is the Air Force with a number of very modern, very capable high performance planes. For example, we had 143 F-16s when we started; we now have 1,468, and we have requested 180 in fiscal years 1988 and 1989.

CHART 25

TACTICAL AIR FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
	FY 1980	FY 1986			
MISSILES:					
Sparrow	10,428	13,411	19,157	558	-
Sidewinder	16,127	23,008	26,764	1,244	760
IIR Maverick	0	942	10,368	2,701	2,631
Phoenix	1,789	1,852	3,152	430	560
AMRAAM	0	0	180	630	1,800

R&D PROGRAMS REQUESTED

The Air Force missiles are all shown on this table along with the R&D programs that we are requesting in the 2 years, together with the amounts enacted in 1987. There is a strong increase for the Strategic Defense Initiative reflecting the high priority that we attach to it. There is a decrease now in the MX Peacekeeper missile, and the follow-on basing is added. The small missile is there at the request of many Members of the Congress, and a number of the other efforts that we have made and are making to make sure that we do not fall behind in this important area where we do have a lead over the Soviets, the high technology field.

CHART 26

MAJOR FY1988-FY1989 RDT&E PROGRAMS

($ in Millions)

	Enacted FY 1987	FY 1988	FY 1989
Strategic Defense Initiative	3,243	5,221	6,282
PEACEKEEPER	279	49	39
PEACEKEEPER FOLLOW-ON BASING	116	593	1,248
Small ICBM (Incl. Basing)	1,153	2,233	2,174
National Aerospace Plane	110	241	310
LHX Helicopter & Engine	143	408	616
Forward Area Air Defense	185	309	385
V-22 Tilt Rotor Aircraft	423	466	307
SSN-21 Attack Submarine/SUBACS	526	556	588
Advanced Tactical Fighter	249	537	703

MILITARY CONSTRUCTION PROGRAMS

Military construction programs primarily are devoted to construction for the light infantry divisions in New York and Alaska; NATO infrastructure which is the critically important part of our support of NATO; and Guard and Reserve construction which is necessary to improve and hold the high recruitment levels of the Guard and the Reserves.

CHART 27

MAJOR FY1988-FY1989 MILITARY CONSTRUCTION PROGRAMS

($ in Millions)

	FY 1987	FY 1988	FY 1989
Light Infantry Divisions, Fort Drum, NY	262	231	214
Light Infantry Division, Alaska	73	99	83
Strategic Defense Initiative	10	125	18
Navy Strategic Homeporting	97	273	197
NATO Infrastructure	232	396	412
TRIDENT Basing	168	131	52
PEACEKEEPER Rail Garrison Basing	-	4	58
Guard and Reserve Construction	480	579	522
Base Closure	-	45	48

The equipment procured for the Guard/Reserve, again, is shown here, and we try to do this in as economical a way as possible, while acquiring for them modern equipment so that they will be fully trained.

ACQUISITION IMPROVEMENTS

Lastly, Mr. Chairman, a couple of charts on our management of the department. The top statistic is the one, I think, of which we are most proud, and should be, because it shows the major weapon systems. I think in 1984 and 1985, a number which was going up at the rate of 14 percent a year when we came in, is now going down at the rate of 1 percent a year. Our multiyear procurement has saved $7.7 billion, and there is another $1 billion of savings anticipated. We lost a lot of the requests that we made for multiyear procurement last year. But we have had 46 approved during this administration. I think we requested 70 during that period.

CHART 28

Major Equipment Procured for Guard/Reserve

	FY 1987	FY 1988	FY 1989
Army			
UH-60 Blackhawk Helicopters	5	3	4
Bradley Fighting Vehicles	-	9	16
M119 Howitzer	-	54	36
High Mobility Multipurpose Wheeled Vehicles (HMMWV)	2,020	52	372
5 Ton Trucks	-	738	1,840
Navy			
UH-60 Blackhawk Helicopters	-	3	3
5.56mm Carbine	-	278	836
Air Force			
Flightline Tow Tractors	58	10	34
Trucks	720	781	497
Runway Cleaners	35	83	61

CHART 29

ACQUISITION IMPROVEMENTS

- **Cost Growth for Major Weapon Systems:**
  - end of CY 1980 14%
  - end of CY 1985 <1%
- **Multiyear Procurements:**
  - FY 1982-FY 1987:
    - 46 multiyear contracts approved;
    - $7.7 billion in projected savings.
  - FY 1988/FY 1989:
    - 9 multiyear programs requested;
    - $1.0 billion in anticipated savings.
- **Increased Use of Competitive Contracts:**
  - FY 1981: 40 % of all contracts awarded competitively
  - FY 1986: 79 % of all contracts awarded competitively
- **Spare Parts Acquisition Initiatives:**
  - Savings of $3.8 billion FY 1984 - FY 1986.

Nearly 80 percent of all of our contracts being awarded competitively. And, we have accrued a savings of $3.8 billion in the acquisition of spare parts over the past 3 fiscal years.

Senator LAUTENBERG. Mr. Secretary, just one clarification of the top line, cost growth for major weapon systems. Are we talking about the quantity of major systems acquired?

Secretary WEINBERGER. No, the actual growth in cost of those systems——

Senator LAUTENBERG. At a similar system 5 years ago costs?

Secretary WEINBERGER. Right; yes, sir; 14 percent a year when we got here; now below 1 percent.

Senator JOHNSTON. Per unit? Is that per unit or gross?

Secretary WEINBERGER. It is the growth figure.

Senator JOHNSTON. I mean is it per unit growth figure or overall growth?

Secretary WEINBERGER. It is calculated to give a realistic impression of annual program cost growth.

Senator JOHNSTON. Thank you.

CHART 30

DOD EFFORTS TO CURB WASTE, FRAUD AND ABUSE

CONTRACT AUDITS:

• Estimated savings	$9.0 billion

INTERNAL AUDIT OF DOD ACTIVITIES:

• DOD, IG estimated savings (since FY 1982, 700 reports)	$4.8 billion

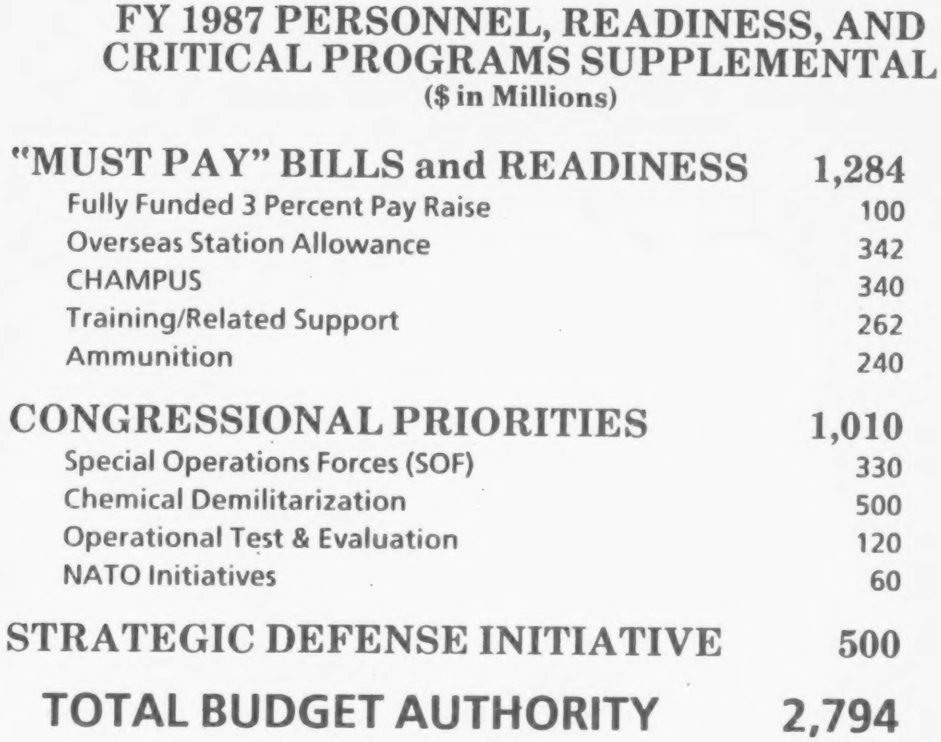
INVESTIGATIVE ACTIVITIES:

• Recoveries, restitutions, fines, and penalties	$100 million

AUDITS AND INVESTIGATIONS SAVE $15 BILLION

Secretary WEINBERGER. And again, over the years a savings of close to $15 billion has been made as a result of our intensive audits, our internal audits, and our major investigations.

CHART 31



FY 1987 PERSONNEL, READINESS, AND CRITICAL PROGRAMS SUPPLEMENTAL
($ in Millions)

"MUST PAY" BILLS and READINESS	**1,284**
Fully Funded 3 Percent Pay Raise	100
Overseas Station Allowance	342
CHAMPUS	340
Training/Related Support	262
Ammunition	240
CONGRESSIONAL PRIORITIES	**1,010**
Special Operations Forces (SOF)	330
Chemical Demilitarization	500
Operational Test & Evaluation	120
NATO Initiatives	60
STRATEGIC DEFENSE INITIATIVE	**500**
TOTAL BUDGET AUTHORITY	**2,794**

Finally, our supplemental which we presented a week before the budget, which would bring the total budget authority for the department up to the level approved by this committee. As you know, the Appropriations Committee has voted less than the amount this committee approved for the defense, and these are things that we believe are vital.

The first group are the things that we have to pay anyway—the pay raise, the CHAMPUS payments and ammunition supplies—the congressional priorities that were not fully funded as a result of this reduction, and $500 million to enable us to proceed with the Strategic Defense Initiative without cancelling programs.

That is it, Mr. Chairman. I appreciate very much your time and patience, and I will be glad to try to answer your questions.

Chairman CHILES. Thank you, Mr. Secretary.

[The prepared statement of Secretary Weinberger follows:]

STATEMENT OF
THE SECRETARY OF DEFENSE
CASPAR W. WEINBERGER

BEFORE THE
SENATE BUDGET COMMITTEE

IN CONNECTION WITH THE
FISCAL YEAR 1988/FISCAL YEAR 1989
BUDGET FOR THE
DEPARTMENT OF DEFENSE

JANUARY 13, 1987

Introduction:

Mr. Chairman, distinguished members of the Committee, I appreciate this opportunity to discuss the President's defense budget for fiscal years 1988 and 1989. The President and I have been longtime proponents of a two-year budget. In the FY 1986 Department of Defense Authorization Act, the Congress expressed its intentions to authorize a two-year budget for the Department of Defense for FY 1988/FY 1989. Subsequent to these optimistic words, however, the authorization process for FY 1987 nearly failed altogether. The appropriations committees failed to achieve separate DoD appropriations legislation, resorting ultimately to an omnibus continuing appropriations bill. And, in the midst of the struggle to achieve some degree of control in the budget process, the topline for the Department of Defense fell to a level lower than that approved for FY 1985. In efforts to meet arbitrary fiscal targets, it often appeared as though legitimate program requirements became irrelevant to the review process.

It is exactly this kind of budgetary chaos that two-year budgeting may prevent by allowing us the opportunity, every other year, to focus on overall defense issues and priorities rather than line item detail and budget totals. I am enthusiastic about the opportunities inherent in two-year budgeting and will work with you to ensure its success. I intend to persist in my attempts to explain and defend the defense requirements presented in the President's budget. I hope that you and your colleagues in the Congress will strive to get the budget process back on track. All of us within the Department of Defense stand ready to assist you in any way we can as you review this defense budget.

If two-year budgeting proves successful, the FY 1988/FY 1989 defense budget will be the last budget to be fully implemented by this Administration for the Department of Defense. It has been a tumultuous seven years. We have had the

Congress embrace the President's military program enthusiastically and throw its bipartisan support behind our revitalization efforts. And, more recently, we have seen that enthusiasm wane and defense funding levels fall. As a result of that early support, we have seen dramatic improvements in many areas of our military. We have quality people, with quality equipment, whose capabilities are more developed than at any time in the recent past. But, surely no one in this room would expect continued progress if funding levels fail to provide for even small levels of growth. The costs of goods and services in the marketplace are declining no more for defense than for others. We seek efficiencies and economies wherever we can, but we cannot expect them to generate sufficient savings to offset the effects of lower funding levels. Lower levels of defense funding, quite simply, mean lower levels of defense. We will have to procure reduced quantities of equipment; we will have to operate and train at reduced rates; and we will have to reduce the level of research and development of future technologies. And, we will have to do this at a time when the challenges confronting this Nation are increasing. The President's budget requests a small but essential level of growth for the Department of Defense. It does so within the deficit targets mandated by Gramm-Rudman-Hollings legislation. We do not challenge the need to control the deficit. But, we must do so without undue risk to the significant progress made in improving our military forces.

The DoD Budget:

The budget before you today requests budget authority of $303.3 billion in FY 1988 and $323.3 billion in FY 1989. This reflects 3 percent real growth per year in funding. We cannot continue to experience negative growth in defense funding levels without placing at risk the military improvements accomplished with prior year investments. We need 3 percent real growth to sustain improvements made early in this Administration and to continue approved policies and programs. Outlays are projected at $289.3 billion in FY 1988 and $303.7 billion in FY 1989.

It is important to realize just how much of this year's budget request supports prior year investments and how much will be applied to new investment. If the Department did not procure one new weapon, one new piece of equipment, or any additional research, we would only realize a reduction of $30.2 billion in outlays in FY 1988. Similar action in FY 1989 would save only $34.2 billion. New investment programs account for only 10.4 percent of total defense spending in FY 1988 and 11.3 percent in FY 1989. So, you can see where we are forced to take reductions when funding levels result in negative growth. Failure to invest in new procurement or new research and development robs the future. But just as surely, failure to provide sufficient funds to support existing and previously funded systems robs the past by rendering investments made in prior years less effective.

While we have been increasingly unsuccessful in achieving our desired funding levels for defense, we have been increasingly successful in making those resources go further. We have supported growth in the defense budget only to the extent that it provides additional capability. We have focused on management reforms and streamlining the acquisition process. Wherever possible, we have taken advantage of competition and private sector investment. It is unfortunate that, as we demonstrate increasing success in these areas, many in the Congress view these accomplishments as reasons for imposing additional reductions to our programs. We find ourselves in a 'damned if we do, damned if we don't' situation.

I would like to take a moment now to review the defense program supported by the FY 1988/FY 1989 budget request.

The FY 1988/FY 1989 Defense Program:

Obviously, a major concern in formulating the defense programs for FY 1988 and FY 1989 was the need to continue to improve our defense posture, albeit at a lower level than required as a result of congressional action on recent requests. With this Administration and the Congress working together, I believe our overriding objective must be to keep defense funding on an even keel, avoiding the peaks and troughs that have plagued our military investments over the years. If this nation could achieve even a modest commitment to annual growth in the defense budget, we would find our resources better utilized and our military better supported than under the 'roller coaster' funding pattern that prevails. When we underfund defense programs, we not only reduce our ability to modernize and adequately support our forces, but we push costs into the future, where we will ultimately pay higher prices. It will take tremendous national resolve and more time and resources to recover from these troughs, as we discovered in 1980.

Fortunately, in 1980 the resolve was there and the resources were available. Yet, had we merely maintained a commitment to 2 percent growth in military spending over the last twenty years, we would be further ahead militarily than we find ourselves today. And, ironically, we have failed in some cases to achieve that which we have demanded of our allies. Zero or negative growth undercuts our efforts to lead our allies to restore a balanced and vital deterrent.

This Administration has successfully met the political and economic challenges that appeared overwhelming in January 1981. The economy has expanded, record levels of new businesses have been incorporated, and there is greater investment in plants and equipment than ever before. Inflation is at its lowest level in nearly a decade-and-a-half. The Administration has also been successful in meeting the national security challenge. But, just as businesses need sustained investment to grow, so does our nation's security depend on consistent and sufficient defense budgets. The threats to our security and that of our allies are no less today than in 1981. One might even say they have increased as the preoccupation with the deficit detracts from the real and sole purpose of the defense budget. The defense budget is one reflection of this nation's commitment to national security. We must not lose sight of that commitment in the heat of budget rhetoric and political processes.

One need not look far to find the threat to those values and institutions that this nation holds dear. We need only observe Soviet domination of Eastern Europe, the occupation of Afghanistan, and their influence in Nicaragua, in Cuba, in Syria and Libya, or in Angola and Ethiopia. None of these examples is recent. Since this Administration took office, this list has not grown. The most tangible success of our military revitalization has been the resulting relative inaction of our adversaries. Not only have there been no new Afghanistans, but the Soviets have demonstrated an increasing willingness to return to the negotiating table. These are no small consequences. These are very realistic responses to the strong and visible commitment this nation has demonstrated in these last six years to the modernization of our military forces. Our gains have been impressive, perhaps more so to our adversaries than to some at home.

And now we stand at the threshold of potentially significant gains in arms control and reduction. The United States and the Soviet Union have initiated serious and productive discussions that promise a future less threatened by strategic arms. But, reducing strategic arms does not lessen the need for defense. Rather, it becomes all the more critical that we protect nuclear deterrence at lower levels and also strengthen conventional capability. We have carefully structured our defense program to provide for increases in our conventional readiness and sustainability. Strategic weapons notwithstanding, we confront an awesome conventional threat. Roughly half of Soviet conventional forces face Europe. The Warsaw Pact forces continue to widen their numerical advantage in ground and tactical air weaponry over NATO forces. Further, they continue to make substantial progress in the quality of those weapons. In addition, the Soviets sustain a war in Afghanistan and supply arms to middle eastern states hostile to the United States and her allies. Some of the Soviets most ambitious efforts to influence other nations occur by proxy, primarily through Cuba. Cuban troops actively represent Soviet interests in Ethiopia and Angola, and aid the leftist regimes of Nicaragua and Mozambique.

Military Personnel

Active Duty Personnel

Nowhere have our efforts to improve our military forces been more evident than in the quality and the experience of our military personnel. The budget requests $78.3 billion in FY 1988 and $81.6 billion in FY 1989 for military personnel costs. Military personnel end strengths remain essentially flat through the budget years, increasing only as necessary to man new ships, squadrons, equipment, and associated support units scheduled to enter the force structure during this period. Levels requested for the Army will support a force structure of 28 active and reserve divisions. The increased levels for the Navy are tied directly to fleet readiness requirements. The Air Force levels decline somewhat, with the focus being placed on retention of quality personnel.

Recruiting and Retention

While we have made significant improvements in the area of recruiting and retaining our military personnel, we cannot ignore the implications of an improving economy and a shrinking population pool on our efforts to compete with the private sector for quality people. We began to see some softness in our gains at the end of FY 1985, and figures for FY 1986 confirm that future success in this area will not come easily.

In order to be competitive, the budget continues our support for adequate levels of compensation and a basic standard of living for all our service members. The budget constraints of these past few years have caused military pay raises to remain at modest levels. Still, the Administration remains committed to the principle of pay comparability. Only by providing an attractive overall military compensation program can we even begin to attract and retain the appropriate mix of experience and skills. The budget requests a 4 percent military pay raise in FY 1988 and 4.3 percent in FY 1989. These levels will generally approach the expected increases in civilian wages as measured by the Employment Cost Index.

Reserve Components

Reserve forces continue to make a significant contribution to the total force. The budget reflects an increase of 32,964 end strengths in FY 1988 and 23,100 in FY 1989 for the Reserve and National Guard components. These increases are commensurate with their growing role in the Total Force Structure and accompany the deliveries of additional equipment.

Consistent with the increasing demands placed on our reserves, they continue to receive our most modern military equipment. Through the budget period, early deploying reserves will receive Bradley Fighting Vehicles, AH-64 Apache and UH-60 Blackhawk helicopters, KC-130T tanker and C-130H cargo aircraft, as well as F-16 fighters.

The Naval Reserve Force (NRF) is being expanded with the scheduled establishment of two reserve squadrons of countermeasures helicopters. All new MCM-1 mine countermeasures ships will be operated eventually by the NRF along with a growing number of amphibious assault ships.

Civilian Personnel

The budget request for civilian personnel supports end strength estimates of approximately 1,123,000 in FY 1988 and 1,125,000 in FY 1989 to support a wide range of programs and activities. The budget requests a 2 percent pay raise in FY 1988 and 3 percent in FY 1989 for the civilian workforce, effective January 1 of each fiscal year. We continue to place emphasis on improving the acquisition process through improved contract administration and audits, and it is largely through the efforts of our civilian personnel that we are attempting to ensure that defense resources are properly and efficiently utilized.

Modernization

Strategic Forces

The improvements already achieved and our commitment to continue the modernization of our strategic forces have played a large role in creating a favorable atmosphere for arms reductions talks. Older systems, some of which have bee operational for over twenty years, are being replaced with newer, more capable systems. The first of five squadrons of B-1B bombers is now in service. These aircraft, along with air-launched cruise missiles deployed on selected B-52 bombers, provide a reliable deterrent that will be further enhanced with the introduction of the Advanced Cruise Missile (ACM) and the Advanced Technology Bomber (ATB) in the late 1980s or early 1990s.

Eight Trident submarines have been delivered and we continue to build one submarine a year. The development of the D-5 missile is on schedule and will provide us with the ability to retaliate effectively against hardened Soviet targets using sea-based forces. The first of 50 Peacekeeper ICBMs are being installed in Minuteman silos and serve as a powerful deterrent. In addition, the President recently approved development of a mobile, rail garrison basing mode for the Peacekeeper, and full-scale development of a single warhead Small ICBM.

Equally significant, although less visible, are the gains we have made in our command, control, communications, and intelligence (C^3I) systems. Our ability to direct an effective response in the face of nuclear attack has been strengthened.

Strategic Defense Initiative

Strategic arms limitations will not be a panacea for possible military confrontation, but they are important steps along the road to lasting world peace. We are more optimistic about that journey because of the strides we have made in improving our military forces and in exploring the alternatives to basing our security on the deterrent of mutual annihilation. The Strategic Defense Initiative remains the cornerstone of our policy to responsibly reduce our reliance on offensive ballistic missiles for nuclear deterrence. We take it seriously. More importantly, so do the Soviets. By the late 1990s, more advanced defense may substantially change the nature of the strategic deterrence. Our SDI has made impressive progress in developing technologies that will make defense against ballistic missiles feasible. If our efforts in this area are successful, we could enter an era where we are no longer dependent almost exclusively on strategic offensive weapons.

While the Administration's SDI program has received a great deal of publicity and has been subject to much debate, the Soviets have proceeded with an impressive SDI effort of their own. Moscow is surrounded by the only operational antimissile defense system in the world. Begun in the 1960s, this system has been continually upgraded with improved radars and missiles. The Soviets are actively at work on advanced SDI technologies in a level of effort that compares to our own. The Soviets currently possess prototype ground-based lasers that could be used to interfere with U.S. satellites. And, they are continuing research in particle beam, radio frequency, and kinetic weapons. We cannot fail to respond to this challenge. Furthermore, SDI is integral to arms control. It permits us to make significant reductions in offensive weapons by supplying an insurance policy against noncompliance.

Conventional Forces

As we seek progress in strategic arms control, our other nuclear and conventional forces assume greater importance. We must ensure that our forces are provided with modern, well maintained, and sufficiently supported equipment. Conventional forces must be carefully balanced between active and reserve and between our own and allied capabilities.

Our conventional forces are structured and deployed primarily to counter our most serious global threat--Soviet military power. In Europe, the conventional force balance has historically favored the Warsaw Pact. For over three decades, the Warsaw Pact has maintained substantial quantitative advantages over NATO in ground and tactical air forces in theater. The Pact has maintained an advantage of over 2-to-1 in main battle tanks for the past twenty years. Over the same period, they have increased their advantage in artillery from less than 2-to-1 to over 3-to-1. Since 1965, NATO has lost its advantage in surface-to-air missiles (SAMs) and combat helicopters. The Pact has consistently deployed infantry fighting vehicles faster than NATO. Today they hold roughly a 3-to-1 advantage in those types of systems. The Soviets' military advantage has been the ability to mass-produce weapons. Their production rates have exceeded NATO for at least ten years and have allowed the Warsaw Pact to expand and modernize various elements of their conventional forces. The sophisticated new fighter aircraft and major combatant warships that have recently begun entering Soviet forces, however, have been delivered thus far at notably lower rates than their predecessors. Accordingly, our ability to compete numerically--particularly in conjunction with our Allies--appears to have improved.

The Conventional Defense Improvements (CDI) program within NATO, established in response to the need to enhance conventional capabilities in the face of this significant ground forces equipment numerical advantage, is intended to identify emerging technologies that will improve the conventional balance. This effort, in conjunction with initiatives to increase the level of arms production cooperation will ensure that our conventional forces remain a realistic deterrent and may even reverse recent unfavorable trends.

But, the Soviet threat is global. They are continually upgrading the equipment of over 50 divisions deployed in the Far East and modernizing more than 40 tactical air regiments. The Soviet Pacific Fleet is their largest fleet. And, in the Middle East and Southwest Asia, the Soviets continue to enhance their presence by maintaining ground divisions, tactical aircraft, and mobile missile launchers in their military districts contiguous to the region. Our FY 1988/FY 1989 program reflects our commitment to maintain a strong conventional military posture to combat this global presence of troops and military hardware.

Land forces

Army and Marine Corps land forces represent the only component of our armed forces capable of holding or retaking territory. An indispensable element of our conventional deterrent, they are forward-deployed in Europe and the Far East. Those located in the United States serve as reinforcements to these forces or are prepared to deploy rapidly to other areas of the world. During FY 1988 and FY 1989 our land force structure and active end strengths remain essentially constant. The Army will field 18 active and 10 reserve divisions, while the Marine

Corps will field 3 active and 1 reserve. The Army will continue to reorganize its active force structure. The light force structure will grow as the 6th Light Infantry Division, based in Alaska, and the 10th Mountain Division, at Fort Drum, New York, each receive an additional active infantry battalion.

The ability of our land forces to fight with little or no warning and to reinforce fighting forces on short notice demands high levels of combat readiness. Readiness, in turn, mandates adequate levels and quality of equipment and proper training. In support of these troops, the budget requests a total of 1,234 Bradley Fighting Vehicles, 1,200 M-1 tanks, and 67 AH-64 Apache helicopters. Combined Army and Marine Corps procurement of TOW missiles will remain at approximately 12,000 a year for FY 1988 and FY 1989. Air defense systems protect our forces during the conduct of close combat and rear defensive operations and the budget years continue our efforts to increase divisional air defense systems. Likewise, the budget will continue to pursue improvements in our ability to detect advancing enemy formations and mass large volumes of accurate, effective firepower against them.

In both FY 1988 and FY 1989, the Army will rotate 28 active and reserve battalions through the National Training Center. The realistic mechanized training available for battalion-sized forces is critical to countering modern Soviet-type armies. To enhance training and sustain readiness, the Army will increase use of simulators and other automated training devices in FY 1988. The Marine Corps air and ground units undergo a rigorous training regime including two live-fire, combined-arms exercises conducted at the Marine Corps Air-Ground Combat Center in California.

We have made progress in recent years in the staying power of our forces through the procurement and prepositioning of major items of equipment and the expansion of stocks of spare parts and other secondary items. Still, we are making slower progress in sustainability than needed and funding for Army and Marine Corps munitions will decrease by 9 percent in FY 1988 and 7 percent in FY 1989 below FY 1987 levels. Funding for secondary-item war reserves will increase slightly in both years.

Naval forces

Over the past six years we have made significant progress in building a larger, more capable fleet. At the end of FY 1986, the Navy had 555 deployable battle force ships, up from 479 at the end of FY 1980. And, the Navy will reach 605 ships by the end of FY 1989. That level represents the minimum objective, given the need to balance force levels necessary to counter the threat within national resource constraints. To sustain this force level in the next decade and beyond, we will need to maintain a steady construction rate of about 20 ships a year.

Within this 600-ship Navy, we seek to achieve specific force structure goals. By the end of the decade, the fleet will include 15 deployable aircraft carriers, 4 reactivated battleships, and 100 attack submarines. Additional new aircraft carriers will be needed to replace carriers reaching the end of their service lives. Initiation of procurement of long leadtime components for two carriers, as proposed in this budget, is the most efficient and affordable way to address this requirement. Due to tighter fiscal constraints, however, achievement of other goals will be delayed until the next decade or later.

We expect the fleet to maintain a high state of readiness through training regularly with other Services and allied navies. Further, we plan to operate at a high tempo. In FY 1988, our request supports 50.5 steaming days per quarter for the forward deployed fleets (the Sixth and Seventh) and an average of 29 days per quarter for the "home" fleets (the Second and Third). Further, efforts will be made to ease the burden of extended overseas deployments on naval personnel through more flexible deployments, including utilizing the battleships for peacetime patrols.

For the most part, the task of building stocks of war reserve spare parts for combatants has been completed, though shortfalls remain in the shore establishments and reserves. Procurement now is focused on achieving munitions needs. The budget request for FY 1988 and FY 1989 includes a total of 985 TOMAHAWK cruise missiles, 262 Harpoon antiship missiles, and 450 MK-48 ADCAP and 377 MK-50 torpedoes.

Supporting our naval forces, the budget requests a variety of sophisticated aircraft. FY 1989 includes long-lead procurement funding for the V-22 Osprey, an advanced tilt-rotor aircraft intended to replace the fleet of CH-46 assault transport helicopters. At the same time, we are continuing our procurement of the CH-53E Super Stallion, the free world's largest helicopter. The Super Stallion provides heavy lift for Marine combat systems such as the seven-ton M198 howitzer and the 14-ton Light Armored Vehicle. Procurement of 6 helicopters in FY 1988 and 7 in FY 1989 supports fielding four squadrons by 1990. The budget also requests funds for the SH-60B/F ASW helicopters, supporting a constrained production cap of 24 SH-60s per year. These antisubmarine warfare (ASW) helicopters will be based aboard almost 100 of our more modern surface combatants, as well as aircraft carriers. Assisting ASW efforts are the P-3C Orion maritime patrol aircraft, serving an important function in long-range offensive operations and barrier patrols. The FY 1988/FY 1989 budget reflects a competitive procurement program for a new P-3G model, with a "winner-take-all" competition for a total of 125 aircraft, including 4 in FY 1990, followed by 25 a year through FY 1994 and 21 in FY 1995.

Tactical air forces

Our tactical air forces represent a flexible, responsive element of our general purpose forces. They can be equipped with a variety of weaponry to support a wide range of military operations. We have seen their effectiveness demonstrated in this past year in the conduct of retaliatory strikes in response to terrorist attacks.

Two-thirds of the Air Force's tactical aircraft are in the active inventory; the remainder are flown by the reserves. Because of fiscal constraints, the Air Force will maintain its total force level at about 37 wings, foregoing the previously planned expansion to 40 wings. The average age of its inventory will be maintained at about 10 years.

In addition to its tactical fighter wings, by the end of FY 1988, the Air Force will operate 14 squadrons (2 active and 12 Air National Guard) of air-defense fighters.

Navy and Marine Corps air wings operate a variety of aircraft types. As an integrated unit, each wing can operate independently in support of carrier battle groups or amphibious forces. The Navy currently has 14 active carrier air wings and two reserve wings. This year, it will introduce a new, "notional" wing configuration, containing a somewhat different mix of aircraft designed to exploit our advantages in air-to-air and air-to-ground combat capabilities. Eventually, 11 of the 14 active air wings and both reserve wings will operate this new mix of aircraft.

The Marine Corps has 3 active air wings and one reserve wing. A typical wing operates some 300 aircraft, organized into 20 to 25 squadrons.

Navy and Marine Corps aircrew readiness is exceptionally high. In FY 1988, they will average 25 hours of flying time per month, or 300 hours a year. This is consistent with FY 1987 levels. It is particularly important that we keep pilot proficiency high, given the recent downward trend in retention. Like the Air Force, the Navy and Marine Corps use Air Combat Maneuvering Ranges and other instrumented ranges to supplement training time in the air.

Through the introduction of new and more capable aircraft, we are able to modernize our air forces and reduce the overall average age of our inventory. The FY 1988/FY 1989 budget proposes a total of 84 F-15E and 360 F-16 aircraft for the Air Force and 24 F-14A/D, 30 A-6F, 156 F/A-18 and 64 AV-8B aircraft for the Navy and Marine Corps.

Supporting and enhancing these air forces are a variety of missiles. The FY 1988/FY 1989 budget includes the procurement of 558 Sparrow; 2,004 Sidewinder; 5,332 Imaging Infrared Maverick; 1,099 Laser Maverick; 990 Phoenix; 5,173 HARM; 2,430 AMRAAM; and 545 Sidearm missiles.

Our defense program for FY 1988/FY 1989 continues to build on the significant gains we have made in conventional forces. The successes we have had in nuclear and conventional deterrence, however, have redirected competition between the Soviet Union and United States to more marginal areas.

Special Operations Forces

As a result, we remain faced with a conflict environment different from either nuclear war or more traditional conventional warfare. An unfortunate side-effect of the success of our conventional deterrent is that our adversaries continue to resort to low-intensity conflict that poses lower risks of larger scale conventional or nuclear confrontation. In most low-intensity conflicts that we have had or that we are likely to encounter, a combination of conventional and Special Operations Forces (SOF) will be needed. In peacetime, SOF, in conjunction with other military forces and federal agencies, participate in security assistance, civic action, and humanitarian assistance operations; they also contribute significantly to our counter-terrorist capabilities. In a broader conflict, the Special Operations Forces are not intended to take objectives or to hold ground. They are intended to complement conventional forces by providing long-range reconnaissance, attacking key targets, obtaining intelligence, organizing partisans and supporting counterinsurgency and guerrilla operations.

This past year, we have addressed and resolved two of the most crucial SOF issues--airlift support and overall organization. The most obvious special operations deficiency has been in airlift and the FY 1988/FY 1989 program requests increased funding needed to meet our wartime requirements. We are enhancing our airlift capabilities by procuring additional fixed- and rotary-wing aircraft and, for the first time, incorporating dedicated SOF tanker support. For the longer term, we have accelerated the procurement of the V-22, the next generation of SOF aircraft.

As part of our revitalization effort, we have undertaken, with the strong bipartisan support of the Congress, a major restructuring of our SOF operations. We will soon establish the Special Operations Command (SOC), a new unified combatant command. All active and reserve component SOF stationed in the United States are being assigned to the SOC. The SOC will have the capability to conduct special operations if so directed by the National Command Authorities. We are also establishing an Assistant Secretary of Defense for Special Operations and Low-Intensity Conflict. This Assistant Secretary will be responsible for both policy and resource oversight, will supervise preparation of SOF programs and budgets based on requirements identified by the SOC, and will represent SOF interests within the decision making councils of the Department of Defense.

SOF, in conjunction with defense and other foreign policy tools, contribute to the Administration's national strategy for combatting low-intensity aggression. Because this form of aggression will remain the most likely and most enduring threat to our security, continued improvement in SOF programs and capabilities continues to be a major priority within the Department. We will succeed as long as we continue to receive strong support and necessary resources from the Congress.

Research, Development, Test and Evaluation

One of the greatest advantages we enjoy over our adversaries is the excellence of our technological base. To protect ourselves from the possibility of some nations gaining future technological advantage over us, we must continue a vigorous program of research and development. The Soviet Union historically has outspent us in research and development, just as they consistently have deployed more new and upgraded systems. However, despite continuing large Soviet investment in military research and development, the United States still maintains leads in 14 of the 20 most important basic technology areas.

The President's highest priority defense effort is the pursuit of experiments and demonstrations to assess the feasibility of Strategic Defense Initiative technologies to support development decisions planned for the 1990s. Other R&D efforts are structured to provide the force of the future. Pursuit of improved integrated circuitry, aircraft propulsion and technology, materials, computers and software, and sensors and signaling technology are among the many areas where we seek to build on our current advantage. Key development programs that will shape the force of the future are: a mobile, rail garrison basing mode for Peacekeeper missiles; the Small ICBM; the LHX helicopter program; Forward Area Air Defense (FAAD); the V-22 Tilt Rotor Aircraft; the SSN-21 Attack Submarine; the Advanced Tactical Fighter (ATF); Navy combat aircraft improvements; very high speed integrated circuits (VHSIC); and the National Aerospace Plane.

Military Construction/Family Housing

Approximately 3 percent of our DoD budget is invested to replace or modernize obsolete facilities and construct new facilities. Our FY 1988/FY 1989 military construction budget request maintains the progress we have made since 1981 and continues to redress the neglect of our facilities caused by inadequate funding in the 1970s. Of special importance are programs that continue the modernization of our physical plant and improve the working and living conditions for our people. We are placing special emphasis on the modernization of our existing family housing inventory and on providing critically needed additional housing, primarily at overseas locations.

Last year I said my goal was to invest at least 2 percent of our total plant value in construction each year. The budget authority we requested last year met that goal. But, even though the Congress voiced its support for improved facilities, the FY 1987 funding for military constuction, including family housing, provided about 80 percent of the budget authority requested. The need for reasonable growth to build better facilities and improve productivity is a perennial issue. I am concerned over the reductions to the military construction and family housing accounts. Congressional action reduced the program to a level insufficient to sustain, maintain, and revitalize our facility plant base. There is a serious need to, at a minimum, maintain budgeted levels of funding to get these programs back on track. Our FY 1988 request of $10.1 billion and our FY 1989 request of $10.6 billion represent the minimum required to meet our immediate facility needs.

DoD Management

One of my top priorities as Secretary of Defense is to ensure that the defense budget is being efficiently and effectively managed. Since 1981, we have initiated numerous efforts to ensure that we are getting the most for our defense dollar. This has become all the more critical in a constrained fiscal environment.

Too often minor instances regarding defense purchases are blown out of proportion. What is not recognized is the awesome task involved in managing an organization of the size and complexity of the Department of Defense. The Department employs 2.2 million active duty military, another 1.9 million in the Reserve Components, and more than one million civilians. Several more million people are working on defense contracts. Defense organizations and facilities span the globe. The Department manages 5,400 properties and installations and operates over 400,000 housing units. The Department deals with over 300,000 contractor establishments and initiates 15 million contract actions each year valued at about $160 billion. Finally, defense supports over one-half of the ship construction and repair industry employment in U.S. private yards.

I say this not to make excuses for management deficiencies, for any deficiency is one too many. The fact is that management of the Department of Defense is a challenge we have faced and improvement in defense management is a success we can claim. We have accomplished this through a variety of management reforms.

We have enhanced the coordination of management efforts. To ensure that key decisions are made quickly, and involve our most senior people, we have placed increased emphasis on the Defense Council on Integrity and Management Improvement (DCIMI)--which is similar in structure to the executive committees found in many major corporations. The DCIMI oversees the development and implementation of a comprehensive plan for management reform.

Implementing the DoD management improvement plan involves aggressively auditing contracts to reduce acquisition costs; focusing efforts to reduce waste, fraud, and mismanagement; ensuring that top level support is both visible and effective; and implementing recommendations made by external sources that are found to be useful and productive. Emphasis is placed on four areas: procurement reform, financial management, productivity improvement, and internal management controls.

Procurement reform

Spare parts management: Three years ago the Department of Defense announced a program to make fundamental changes in the way we purchase and manage spare parts. We have returned to a common sense approach to buying spares, paying prices that offer the greatest value for our defense dollars. Some of the major actions we have taken are:

- the implementation of over 500 spare parts initiatives which are now a permanent part of the way we do business.

- the promotion of increased competition, and the challenging of prices that appear to be unrealistically high.

- the review of 771,000 items as part of a comprehensive "breakout" program to find parts sources other than the prime contractor. Of these, 168,000 were identified for competitive procurement and 170,000 were identified for purchase from the actual manufacturer.

Cost savings and other benefits from the spares reforms have been impressive. Savings from FY 1984 to FY 1986 total $3.8 billion. In addition to the monetary savings, increased competition from the spares initiatives has provided other benefits, such as bringing additional suppliers into the system.

This has broadened the industrial base and improved the overall responsiveness of the Department's suppliers.

Program stability: Program stability contributes to the reduction of total program costs and facilitates long range planning. Two initiatives that support increased program stability are baselining and multiyear procurement. Baselining formally establishes a set of agreed upon goals and objectives that describe the functional specifications, cost, schedule, and other critical factors at the initiation of a major new program. We have established a policy that allows the program manager (PM) to exercise full management authority within the scope of the approved baseline agreement. The Packard Commission emphasized the importance of baselining to program stability and the Congress passed legislation to permit authorization of selected acquisition programs for up to five years unless baseline values for the program are exceeded. We are reviewing service systems to identify appropriate candidates to come under this program stabilizing procedure.

The principal objective of our Multiyear Procurement (MYP) initiative is to achieve savings through economical lot buys. Once the Congress approves a multiyear procurement contract for a major system, we can make a commitment to the contractor that the program will continue, thereby minimizing the contractor's financial risk. Multiyear procurement has accounted for the majority of savings under the acquisition improvement program.

Competition: The high level of management attention directed at improving competition has produced dramatic results. The Department-wide rate of competition for procurement dollars in fiscal year 1986 was $78.7 billion, or 57.2 percent of the total, with another $29.7 billion, or 21.6 percent, of contract dollars being follow-on actions to initially competed contracts.

Financial Management

Financial Management Systems: Improvement of financial management systems within the Department has focused on two primary efforts. First, we seek a single financial management system for each military department and one financial management system for all Defense Agencies. Second, we seek to reduce the number of accounting systems that do not comply with GAO accounting principles and standards. The benefits derived from reducing noncompliant systems and the overall number of financial accounting systems include increased accuracy and a reduction in waste, fraud, and abuse. Current plans call for a 72 percent reduction in total systems and a 93 percent reduction in noncompliant systems by FY 1991.

An associated effort involves the establishment of one civilian payroll system and one civilian personnel system per Military Department, and one integrated civilian personnel/payroll system for the Defense Logistics Agency by FY 1988. The Air Force and the Defense Logistics Agency have already achieved this goal.

Cash management: We have aggressively pursued better payment practices with our industry partners. Over 99 percent of nearly 15 million payments valued at $122 billion were made by the Department without interest penalty payments during FY 1986. During FY 1986, $178 million in Treasury savings were generated by DoD as a result of cash management initiatives to accelerate collections and defer disbursements. Additional savings of $195 million per year are expected during FY 1987 and FY 1988.

Credit management: Total DoD accounts receivable, which excludes foreign receivables, is approximately $925 million. Our portion of the Federal debt is minor, comprising 0.3 percent of the total. However, normal operations do result in debts from such things as payroll overpayments, contractors in default, and dishonored checks. We have established plans to reduce the level of delinquent accounts receivable, and to use credit management techniques to reduce debts. These plans will use collection agencies, credit bureau referrals, salary offsets, penalties and administrative charges, and Internal Revenue Service (IRS) tax refund offsets.

Productivity

The DoD Productivity Program focuses on quality, technology, and the creative management of people in the work place. One of our prime manpower management initiatives is the Efficiency Review Program. It uses industrial engineering techniques to improve work methods and achieve a better internal allocation of personnel. Resources released by this program are then available to meet increasing workloads elsewhere. During FY 1985, 112,000 manpower spaces were covered by efficiency reviews. Reallocation of 843 manpower spaces resulted from these reviews. Dollar savings of almost $32 million have been documented for FY 1985. In FY 1986 over 370,000 manpower spaces were reviewed. Over 200,000 spaces are scheduled for review in FY 1987.

DoD's Productivity Enhancing Capital Investment (PECI) program specifically targets funds for quick return and long-range, high payoff investment initiatives. For instance, investments of $874 million since FY 1977 through FY 1986 are expected to average lifetime savings of approximately $16 for each $1 invested. Investments planned for FY 1987 and FY 1988 are $239 million and $254 million, respectively. A major element of the PECI program is Productivity Investment Funding.

DCIMI

The DoD Council on Integrity and Management Improvement (DCIMI) was established in September 1981, to pursue management improvements throughout the Department. During FY 1986 the council made decisions which included completing additional "should cost" reviews of contracts, studying the costs for increased stockage of spare parts and extended lead times in procurement, approving the DoD Management Improvement Plan (MIP), reducing the number of payroll and personnel systems, correcting material weaknesses reported in the Annual Statement of Assurance, and investigating the impact of procurement procedures on fleet readiness. To ensure the accomplishment of directed actions resulting from the DCIMI meetings, a followup system was developed to track and monitor these actions. During the past fiscal year, there have been 47 directed actions from DCIMI meetings. By the end of FY 1986, 35 of these actions had been completed.

One of the major benefits of the DCIMI is consensus building concerning actions needed to strengthen management. The council also provides focus and momentum for the management improvement initiatives contained in the Management Improvement Plan, and forces issues upward and decisions downward in the Department. The formal followup and tracking system rounds out the DCIMI's comprehensive program.

Contract Audits

Our worldwide contract audit activities are conducted by the Defense Contract Audit Agency (DCAA). DCAA's mission is to perform all necessary contract audits for DoD and to provide accounting and financial advisory services on contracts and subcontracts. The following types of audit services are typically performed by DCAA auditors and result in over 60,000 audit reports annually: proposal evaluations; audits of incurred costs; compliance with the Truth in Negotiations Act; operations audits; compliance with Cost Accounting Standards; termination claims; financial condition reviews; and participation in legal proceedings.

Waste, Fraud, and Abuse

In 1982, the Office of the Department of Defense Inspector General (IG) was established with a concise but far-reaching charter to ferret out and expose waste, fraud, and mismanagement. In order to fulfill this responsibility the IG has established the Assistant Inspectors General for Auditing, Investigations, and Inspections. Further, to provide policy and oversight for the Department's audit and criminal investigative organizations and to ensure followup on audit activities of both the General Accounting Office (GAO) and the IG, the Assistant Inspectors General for Audit Policy and Oversight, Criminal Investigations Policy and Oversight, and Audit Followup were created.

Audit operations: The IG performs audits within the Office of the Secretary of Defense, the Organization of the Joint Chiefs of Staff, the Unified Commands, the Defense agencies, and the Military Departments. Since FY 1982, over 700 audit reports identifying nearly $4.8 billion in savings and cost avoidances have been issued. Potential monetary benefits from all other DoD audits/reviews since FY 1982 total $10.3 billion. The IG will continue its focus on procurement, where a large portion of DoD dollars are expended. Particular attention is paid to waste in overhead charged to DoD contracts, defective pricing, subcontractor pricing practices, and contractor estimating systems.

Audit efforts would be of little value without an aggressive program to ensure that findings and recommendations are carefully considered, and that agreed-upon audit advice is implemented. The DoD Audit Followup and Resolution Program serves this purpose. The internal audit resolution process has successfully concluded corrective action on over 280,000 DoD and GAO audit recommendations, resulting in $14.2 billion in savings and cost avoidances.

The IG provides policy and oversight for 14 audit organizations which assist various DoD management levels on financial matters, internal controls, economy and efficiency, contract pricing, and program results. Significant policy initiatives undertaken to support these organizations include: establishing the most comprehensive auditing standards in the Federal Government; preparing pamphlets to assist auditors in identifying labor and material fraud schemes; and implementing quality control programs for internal audit, internal review, and Military Service exchange audit organizations.

Investigative Operations: The Defense Criminal Investigative Service was established in October 1981 with the primary objective of investigating major theft, fraud, and corruption in the procurement process. Since its establishment IG investigative activities have compiled an impressive seventy percent conviction rate and generated over $100 million in recoveries, fines, penalties, and restitutions. All other DoD Investigative organizations have compiled a total of over $185 million in recoveries, fines, penalties, and restitutions during the same time period. In addition, last year the IG began an aggressive program of covert operations to uncover fraud and theft against DoD. This program is starting to pay dividends by uncovering instances of bribery, kickbacks, mail fraud, wire fraud, as well as an attempt to secure an illegal transfer of weapons.

The Assistant Inspector General for Criminal Investigations Policy and Oversight is responsible for ensuring that effective remedies flow from DoD criminal investigations. This "remedies" approach is not restricted to criminal remedies; it also emphasizes civil, administrative, and contractual remedies. Our record on suspensions and debarments of contractors has improved from 70 suspensions and debarments in 1981 to 885 in 1986.

Implementation of Packard Commission Recommendations and DoD Reorganization

The recommendations of the President's Commission on Defense Management provide us with an opportunity to make even greater strides in management improvement throughout the Department of Defense. In many respects the Commission supported and built upon our initiatives of the past five years. Its recommendations provide us with a useful guide for continuing our progress. In addition to the identification of possible management improvements, the commission's work has been extremely helpful in galvanizing Executive Branch, congressional, and public support for their implementation.

We carefully examined the commission's reports and worked closely with the National Security Council in developing National Security Decision Directive (NSDD 219) which provided Presidential direction on implementation. NSDD 219 approves virtually all of the major features of the commission's recommendations. Following issuance of NSDD 219, we formed an implementation group and developed a plan of action which has been carried out under the personal guidance and direction of the Deputy Secretary of Defense. This implementation group identified 18 major action items. We are moving ahead on all of them. Significant initiatives include: establishment of a Joint Requirements and Oversight Council, which will play a major decision-making role in the management of major acquisition programs; establishment of an Under Secretary of Defense for Acquisition to oversee all acquisition matters within the Department; and the establishment of Senior Acquisition Executives in each of the Military Departments to oversee the major acquisition activities of their respective Services.

In most cases, implementation of the commission's recommendations is being carried out within the Department. In others, authorizing legislation is required. Some of the required legislation has already passed, such as establishing an Under Secretary of Defense for Acquisition, establishing a Vice Chairman of the Joint Chiefs of Staff. A few cases remain where legislative action will be required.

The recent passage of the Goldwater-Nichols DoD Reorganization Act complements the recommendations of the Packard Commission. We are working to ensure that its provisions are incorporated into the Department's structure, policies, and procedures as rapidly and effectively as possible. Implementation actions have been assigned to lead officials, who are responsible to the Deputy Secretary and me for accomplishment, and their progress is monitored through periodic reports and oversight meetings.

Conclusion:

In this period of constrained resources, the Department of Defense has made significant progress in achieving revitalization of our military forces through increasingly efficient and economic procedures. Still, we must maintain the accomplishments to date and strive to reach our goals. We cannot do this without the support of the Congress and the necessary financial resources.

In December, I announced the Administration's intentions of submitting a request for a $2.8 billion FY 1987 supplemental appropriation to cover "must pay" and critical program requirements, to fulfull congressional priorities, and to fund necessary SDI efforts. Reflected in the FY 1987 column of the President's FY 1988/FY 1989 budget, this supplemental funding would, if approved by the Congress, leave the FY 1987 defense budget at zero real growth, or the level specified in the FY 1987 Budget Resolution. The critical nature of the programs for which additional funding has been requested require that at least that level of funding be provided.

Approval of this FY 1987 supplemental request and the FY 1988/FY 1989 program I have presented here today will meet our national security requirements. The defense program is an integral part of the President's budget that has been carefully structured to meet the fiscal targets established by the Gramm-Rudman-Hollings legislation. I urge your careful and serious consideration of our budget request. Enacting a sound, two-year program for national defense will constitute a major step forward in achieving our national security goals.

NATIONAL DEFENSE TOPLINE - 050

(Current $ Billions)

	1987	1988	1989	1990	1991	1992
BUDGET AUTHORITY						
DoD TOTAL	281.7	303.3	323.3	343.9	364.9	386.5
DoE & Other	8.0	8.7	9.1	9.6	10.1	10.4
TOTAL 050	289.7	312.0	332.4	353.5	375.0	396.9
OUTLAYS						
DoD TOTAL	274.2	289.3	303.7	321.0	340.0	361.0
DoE & Other	8.0	8.3	8.5	9.0	9.5	9.9
TOTAL 050	282.2	297.6	312.2	330.0	349.5	370.9

FY 1988/FY 1989 DoD BUDGET
BUDGET AUTHORITY & OUTLAYS
(Current $ Billions)

	FY 1986	FY 1987	FY 1988	FY 1989
BUDGET AUTHORITY	**281.4**	**281.7**	**303.3**	**323.3**
% Real Growth	-4.2%	-2.5%	3.0%	3.0%
OUTLAYS	**265.6**	**274.2**	**289.3**	**303.7**

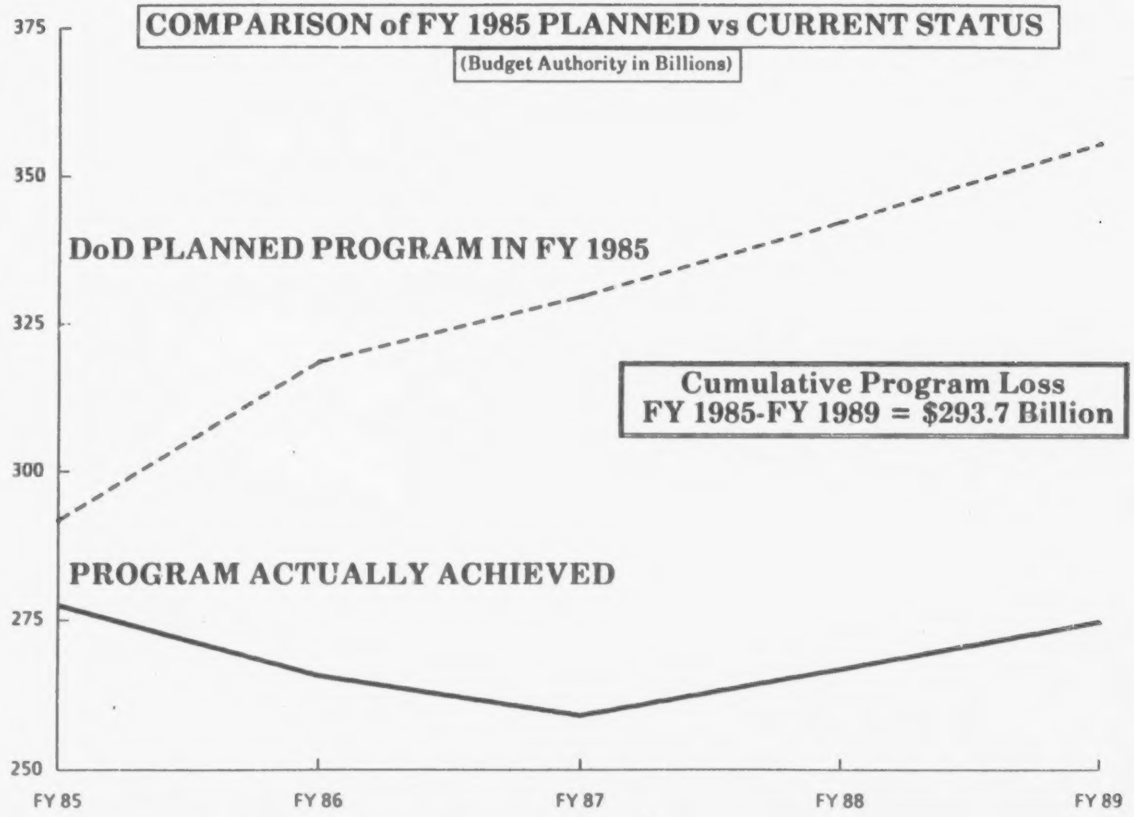
CONGRESSIONAL REDUCTIONS TO THE PRESIDENT'S DoD BUDGET REQUESTS

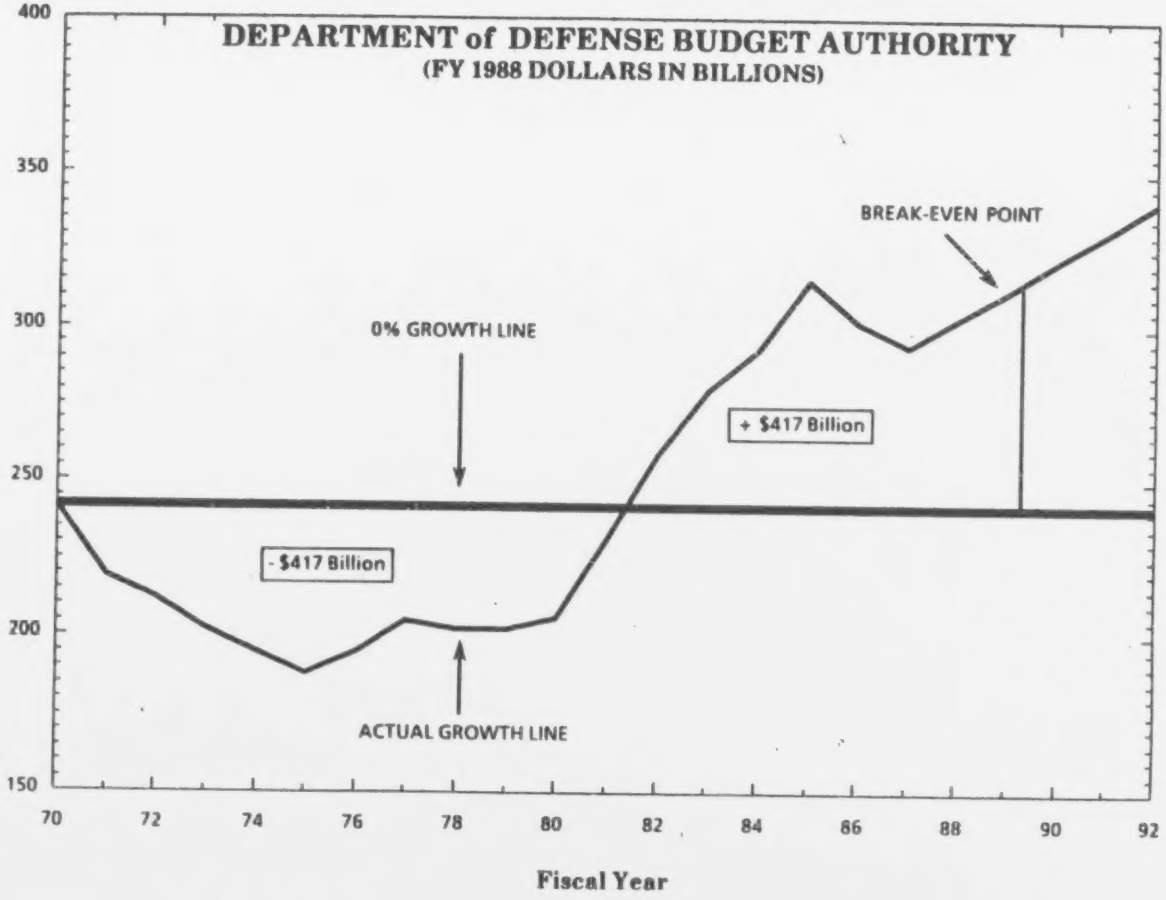
(Current $ Billions)

	1984	1985	1986	1987
PRESIDENT'S REQUEST	**273.4**	**305.0**	**313.7**	**311.6**
Congressional Reductions	-14.7 (5.4%)	-19.5 (6.4%)	-35.3 * (11.3%)	-29.9 (9.6%)
ENACTED **	**258.7**	**285.5**	**278.4**	**281.7**

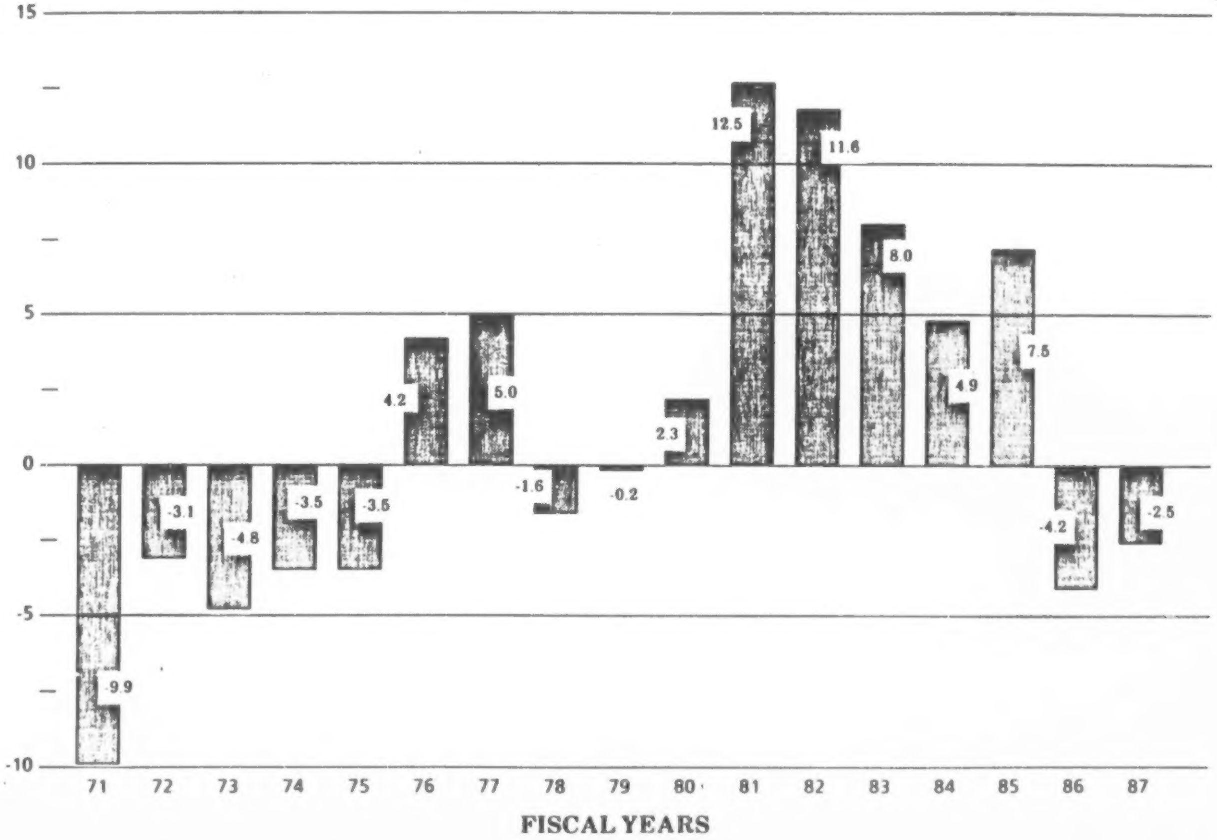
* Includes $11.0 billion sequestered under G-R-H.

** **Excludes Contract Authority.**


COMPARISON of FY 1985 PLANNED vs CURRENT STATUS
(Budget Authority in Billions)
375
350
325
300
275
250
DoD PLANNED PROGRAM IN FY 1985
Cumulative Program Loss
FY 1985-FY 1989 = $293.7 Billion
PROGRAM ACTUALLY ACHIEVED
FY 85
FY 86
FY 87
FY 88
FY 89

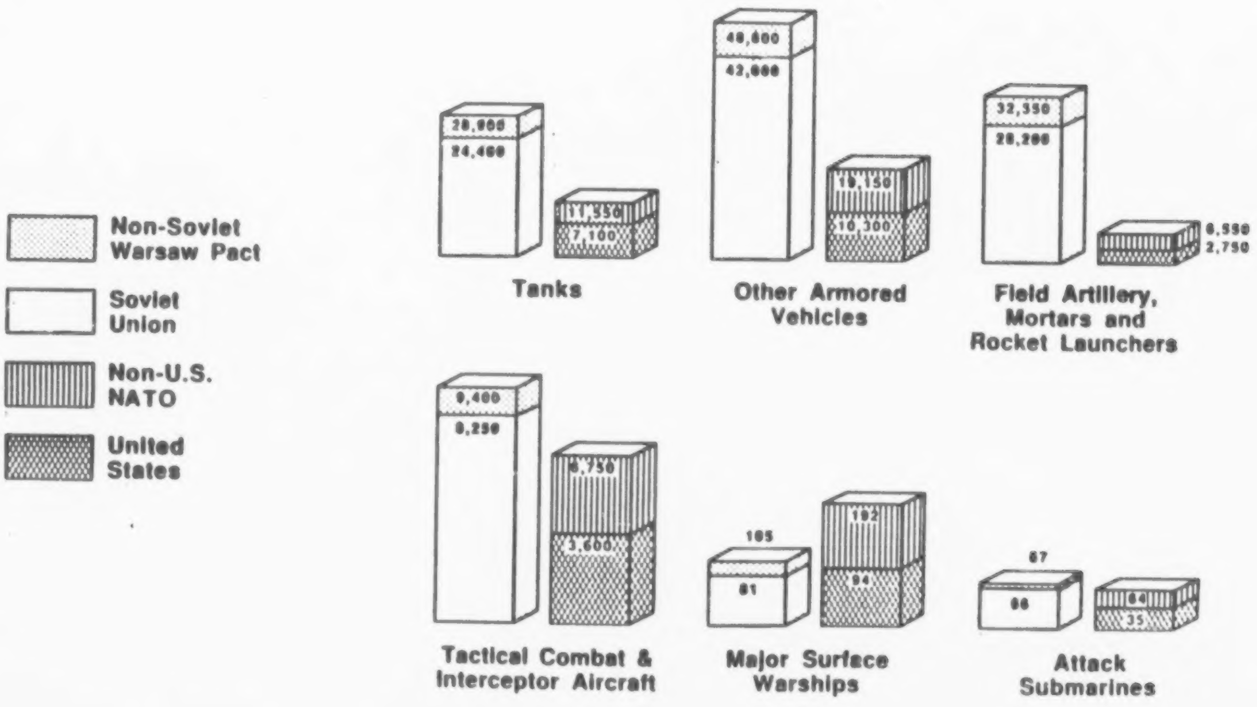

DEPARTMENT of DEFENSE BUDGET AUTHORITY
(FY 1988 DOLLARS IN BILLIONS)
400
350
300
250
200
150
70
72
74
76
78
80
82
84
86
88
90
92
Fiscal Year
0% GROWTH LINE
ACTUAL GROWTH LINE
BREAK-EVEN POINT
- $417 Billion
+ $417 Billion

REAL GROWTH IN DEFENSE BUDGET AUTHORITY

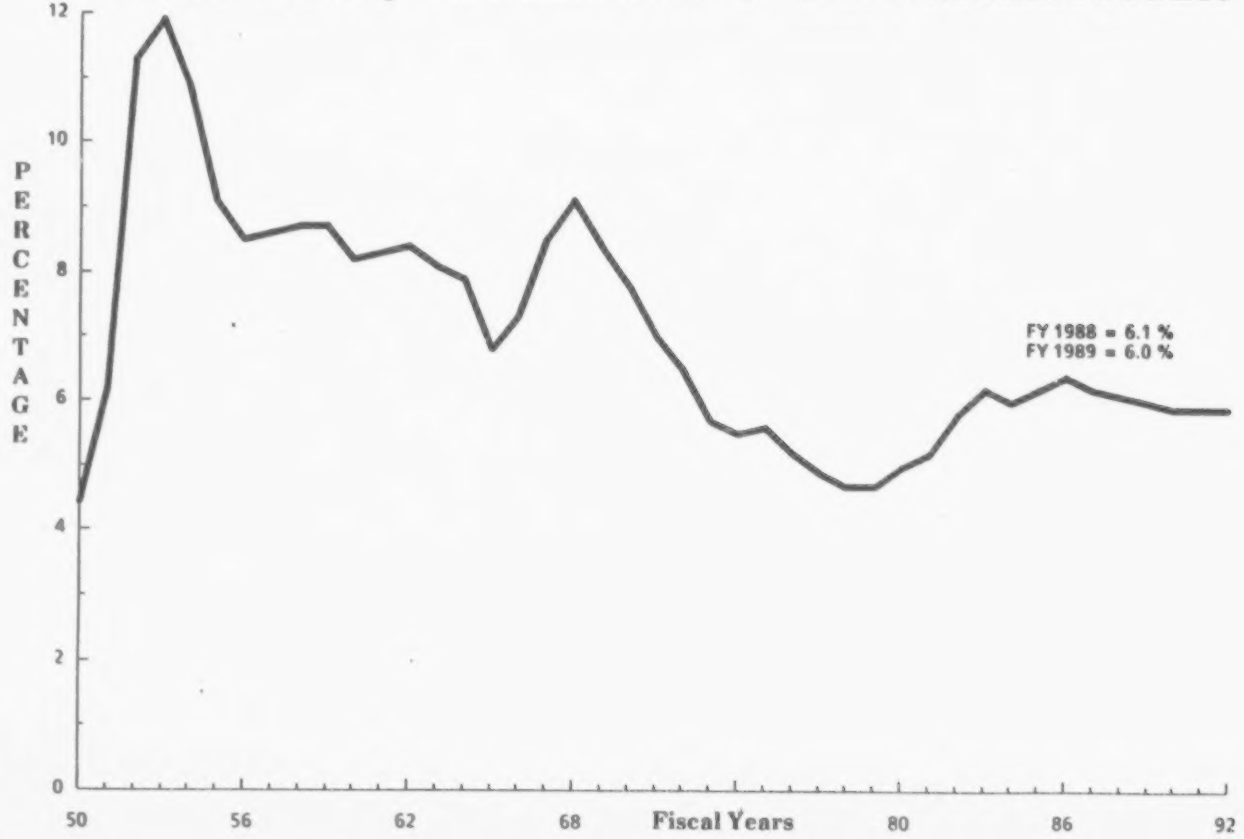


PRODUCTION OF SELECTED WEAPONS FOR NATO and WARSAW PACT FORCES

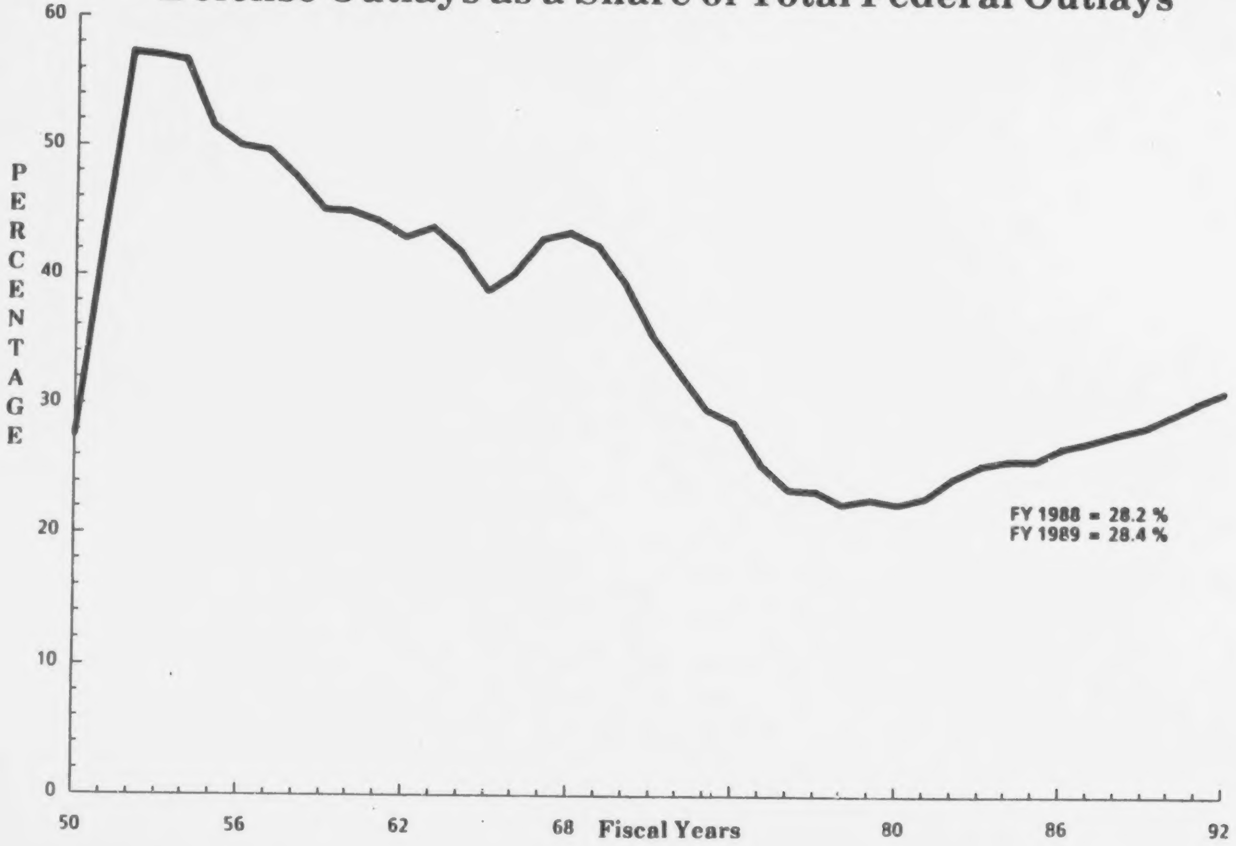
(1977 - 1986)



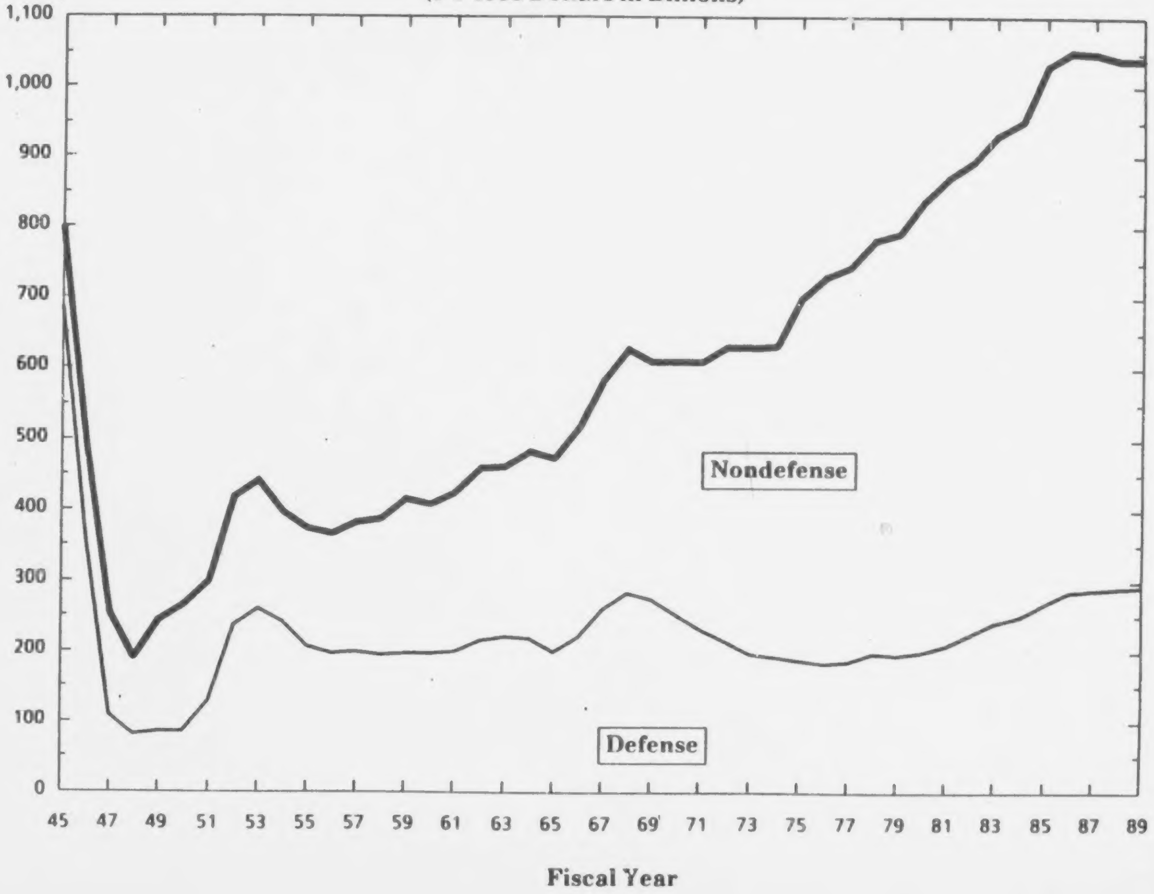
Defense Outlays as a Share of the Gross National Product



Defense Outlays as a Share of Total Federal Outlays



TOTAL FEDERAL OUTLAYS
(FY 1988 Dollars in Billions)



FY 1988/FY 1989 DoD BUDGET
BUDGET AUTHORITY BY TITLE
(Current $ Billions)

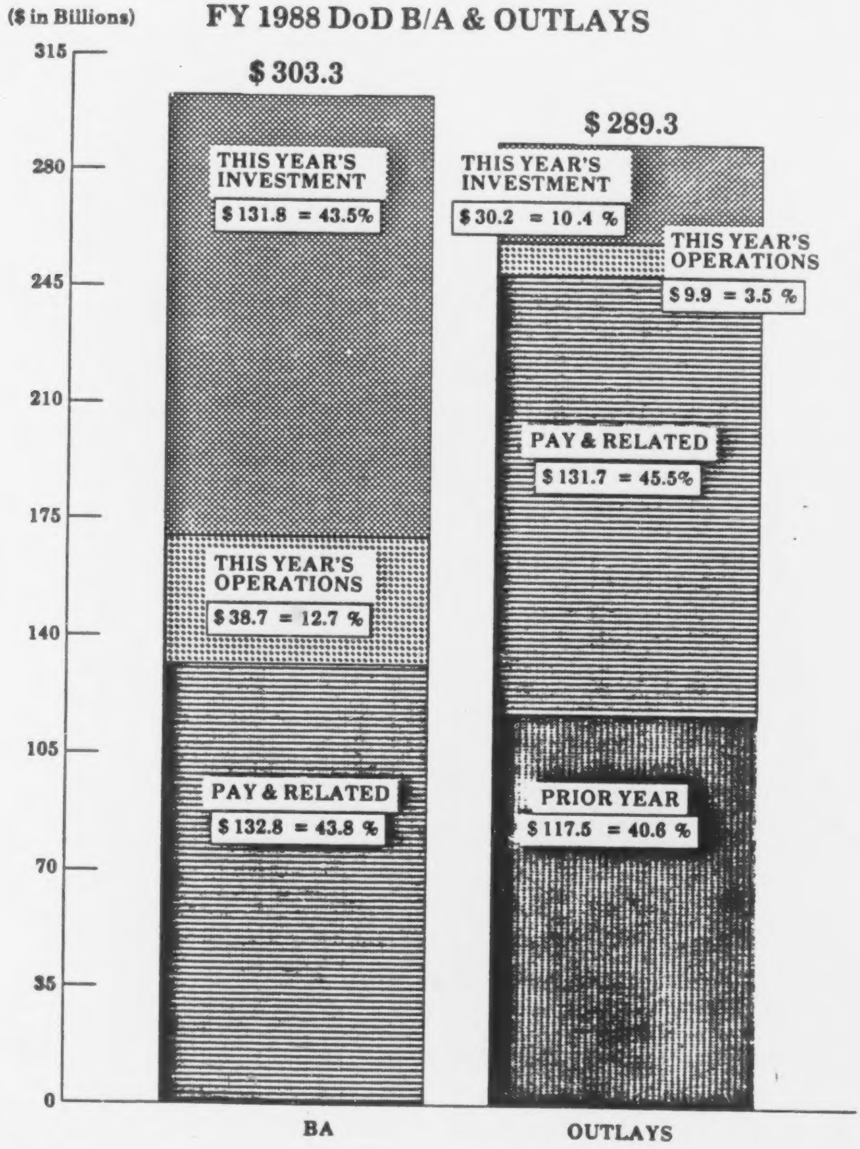
	FY 1986 Dollars	% Change	FY 1987 Dollars	% Change	FY 1988 Dollars	% Change	FY 1989 Dollars
MIL PERS	67.8	8.8%	73.8	6.2%	78.3	4.2.%	81.6
O & M	74.9	4.9%	78.5	10.2%	86.6	5.7%	91.5
PROC	92.5	-7.9%	85.2	-1.4%	84.0	12.7%	94.6
R D T & E	33.6	7.1%	36.0	21.5%	43.7	1.2%	44.3
MIL CONS	5.3	-2.8%	5.1	28.6%	6.6	4.6%	6.9
FAM HOUS	2.8	11.3%	3.1	11.7%	3.5	5.7%	3.7
OTHER	4.5	-	-	-	0.6	-	0.8
TOTAL	**281.4**	**0.1%**	**281.7**	**7.7%**	**303.3**	**6.6%**	**323.3**

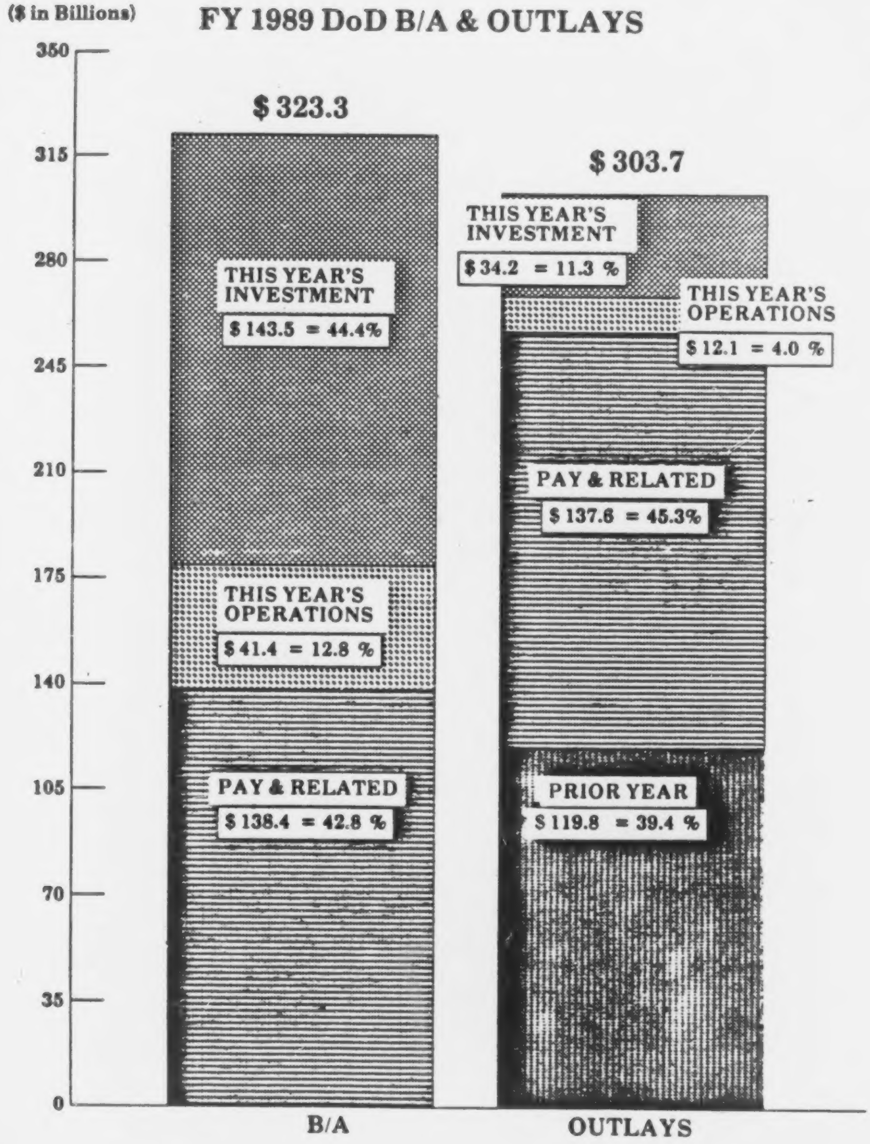
FY 1988/FY 1989 DoD BUDGET

BUDGET AUTHORITY BY MILITARY COMPONENT

(Current $ Billions)

	FY 1987		FY 1988		FY 1989	
	Dollars	Share	Dollars	Share	Dollars	Share
ARMY	74.5	26.4%	80.1	26.4%	84.8	26.2%
NAVY/ MARINE CORPS	95.3	33.8%	102.3	33.7%	108.7	33.6%
AIR FORCE	93.8	33.3%	100.4	33.1%	107.2	33.2%
DEFENSE AGENCIES/ DEFENSE WIDE	18.1	6.4%	20.5	6.8%	22.6	7.0%
TOTAL	**281.7**		**303.3**		**323.3**	


($ in Billions)
FY 1988 DoD B/A & OUTLAYS
315
280
245
210
175
140
105
70
35
0
$ 303.3
THIS YEAR'S INVESTMENT
$ 131.8 = 43.5%
THIS YEAR'S OPERATIONS
$ 38.7 = 12.7 %
PAY & RELATED
$ 132.8 = 43.8 %
$ 289.3
THIS YEAR'S INVESTMENT
$ 30.2 = 10.4 %
THIS YEAR'S OPERATIONS
$ 9.9 = 3.5 %
PAY & RELATED
$ 131.7 = 45.5%
PRIOR YEAR
$ 117.5 = 40.6 %
BA
OUTLAYS


($ in Billions)
FY 1989 DoD B/A & OUTLAYS
350
315
280
245
210
175
140
105
70
35
0
$ 323.3
THIS YEAR'S INVESTMENT
$ 143.5 = 44.4%
THIS YEAR'S OPERATIONS
$ 41.4 = 12.8 %
PAY & RELATED
$ 138.4 = 42.8 %
$ 303.7
THIS YEAR'S INVESTMENT
$ 34.2 = 11.3 %
THIS YEAR'S OPERATIONS
$ 12.1 = 4.0 %
PAY & RELATED
$ 137.6 = 45.3%
PRIOR YEAR
$ 119.8 = 39.4 %
B/A
OUTLAYS

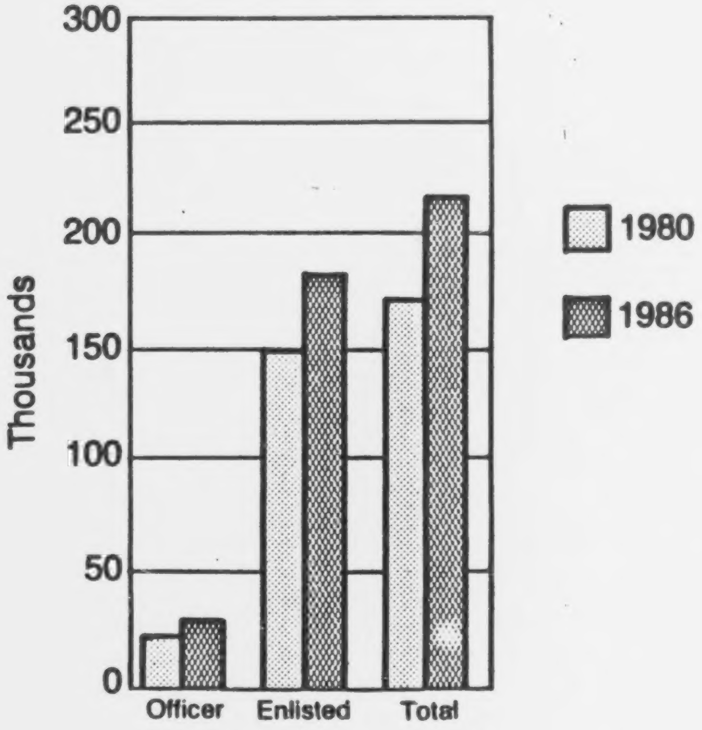
FY 1988/FY 1989 DoD BUDGET

Military Personnel Indicators

	1980	1982	1985	1986
Recruiting Quality				
High School Graduates	68%	86%	93%	92%
Mental Categories I thru III	69%	87%	93%	96%
Retention				
Reenlistments - All Regulars	55%	68%	64%	65%
First Term Reenlistments	38%	53%	48%	49%
Career Reenlistments	70%	85%	84%	84%

WOMEN IN THE MILITARY

(Thousands)



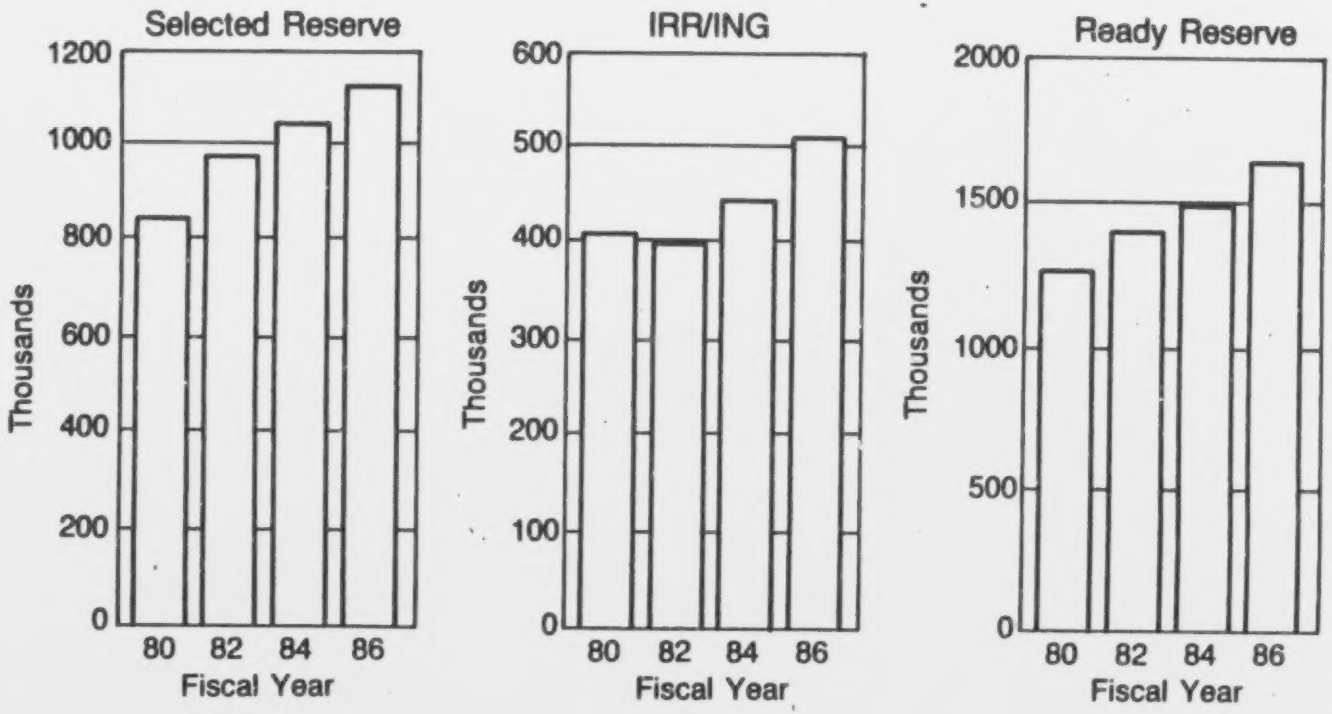
FY 1988/FY 1989 DoD BUDGET
MANPOWER
(END STRENGTH IN THOUSANDS)

	FY 1986	Delta	FY 1987	Delta	FY 1988	Delta	FY 1989
ACTIVE DUTY							
ARMY	781	0	781	0	781	0	781
NAVY	581	+6	587	+6	593	+10	603
MARINE CORPS	199	+1	200	0	200	0	200
AIR FORCE	608	-1	607	-8	599	+2	601
TOTAL MILITARY 1/	2,169	+5	2,174	-2	2,172	+12	2,184
RESERVES							
SELECTED RESERVES	1,130	+27	1,157	+33	1,190	+23	1,213
CIVILIANS							
TOTAL CIVILIAN 2/	1,112	+12	1,124	-1	1,123	+2	1,125

Note: 1. Includes Military assigned to Defense Agencies and Cadets.
2. Civilian End Strength includes Classified, Wage Board, Foreign Indirect, Civilian Technicians, and Permanent Part-time.

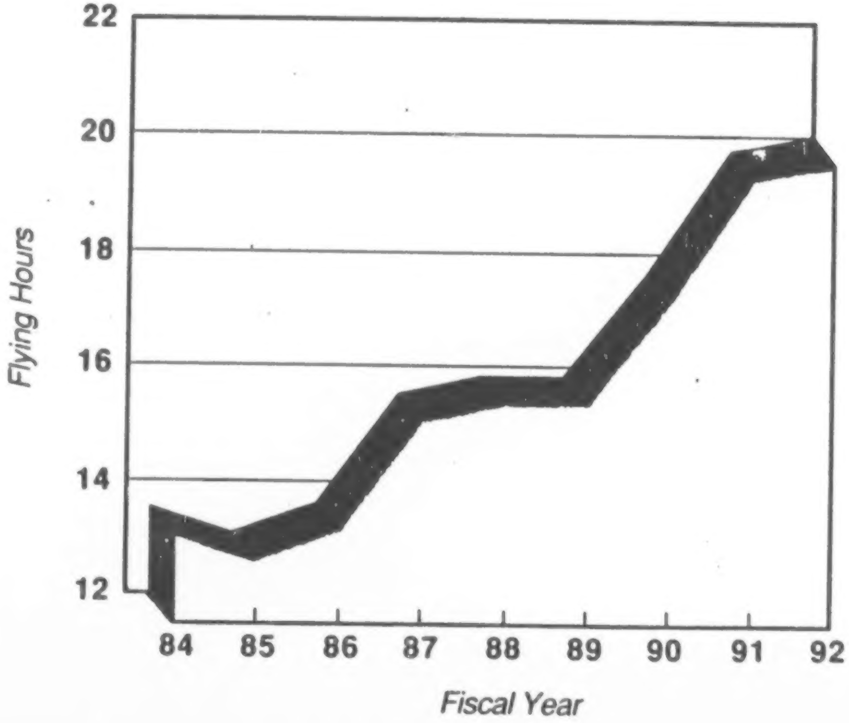
RESERVE COMPONENT MANPOWER GROWTH

(Thousands)



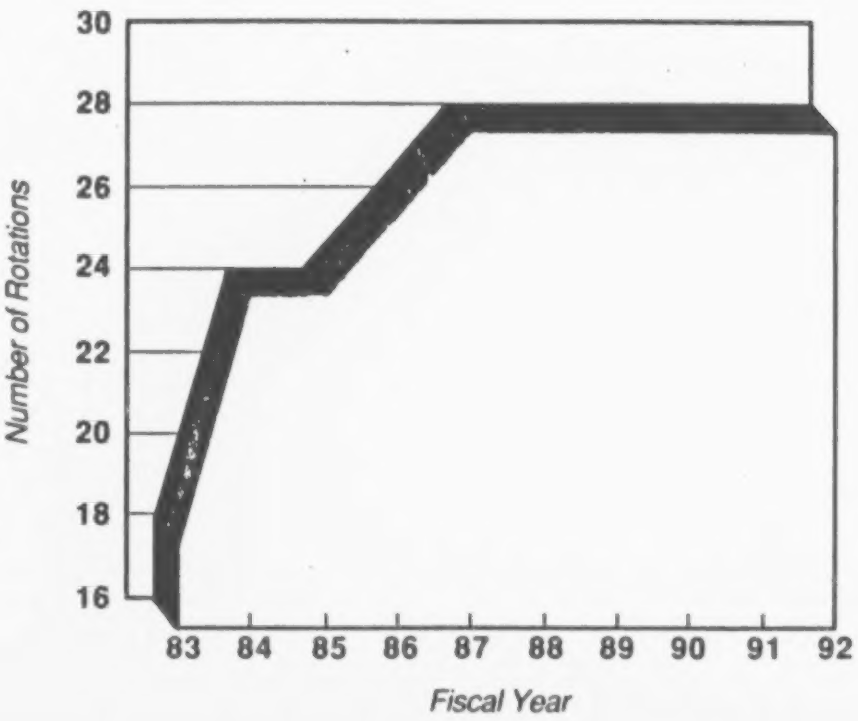
MONTHLY FLYING HOURS PER CREW

(Active Army Forces)



BATTALION ROTATIONS THROUGH THE NATIONAL TRAINING CENTER

(Active and Reserve Army Forces)



LAND FORCES MODERNIZATION

	On Hand FY 1980	On Hand FY 1986	Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
Close Combat:					
M-1 Tanks	34	3,539	5,753	600	600
Bradley Fighting Vehicles	0	2,555	4,351	616	618
Helicopters:					
AH-64 Apache	0	165	526	67	-
UH-60 Blackhawk	0	740	859	61	72
Missiles:					
Patriot	0	1,038	1,790	715	815
Stinger	0	11,836	26,763	7,692	8,115
TOW-2	0	49,741	94,661	12,096	11,304
MLRS	0	80,856	260,322	72,000	36,000

NAVAL FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
	FY 1980	FY 1986			
SHIPS:					
TRIDENT	0	8	14	1	1
SSN 688 Submarine	10	34	56	3	2
CG-47 Cruiser	0	5	22	2	2
SSN-21	0	0	0	0	1
DDG-51 Destroyer	0	0	3	3	3
AIRCRAFT:					
CH-53/MH-53E	0	75	113	14	14
SH-60B/F	0	63	129	24	24

NAVAL FORCES MODERNIZATION

MISSILES/WEAPONS:	On Hand		Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
	FY 1980	FY 1986			
Tomahawk	0	350	991	475	510
Harpoon	609	1,903	2,573	124	138
MK-48 ADCAP	0	0	197	100	350
MK-50	0	0	39	153	224
TRIDENT II	0	0	21	66	66

TACTICAL AIR FORCES MODERNIZATION

	On Hand		Cum FY 1987 on Hand/		
	FY 1980	FY 1986	Pipeline	FY 1988	FY 1989
COMBAT AIRCRAFT					
F-14	264	455	512	12	12
F-15	501	749	877	42	42
F-16	143	972	1,468	180	180
F/A-18	2	323	567	84	72
AV-8B	0	59	174	32	32
MOBILITY AIRCRAFT					
C-17	0	0	0	2	4

TACTICAL AIR FORCES MODERNIZATION

MISSILES:	On Hand		Cum FY 1987 on Hand/ Pipeline	FY 1988	FY 1989
	FY 1980	FY 1986			
Sparrow	10,428	13,411	19,157	558	-
Sidewinder	16,127	23,008	26,764	1,244	760
IIR Maverick	0	942	10,368	2,701	2,631
Phoenix	1,789	1,852	3,152	430	560
AMRAAM	0	0	180	630	1,800

MAJOR FY1988-FY1989 RDT&E PROGRAMS

($ in Millions)

	Enacted FY 1987	FY 1988	FY 1989
Strategic Defense Initiative	3,243	5,221	6,282
PEACEKEEPER	279	49	39
PEACEKEEPER FOLLOW-ON BASING	116	593	1,248
Small ICBM (Incl. Basing)	1,153	2,233	2,174
National Aerospace Plane	110	241	310
LHX Helicopter & Engine	143	408	616
Forward Area Air Defense	185	309	385
V-22 Tilt Rotor Aircraft	423	466	307
SSN-21 Attack Submarine/SUBACS	526	556	588
Advanced Tactical Fighter	249	537	703

MAJOR FY1988-FY1989 MILITARY CONSTRUCTION PROGRAMS

($ in Millions)

	FY 1987	FY 1988	FY 1989
Light Infantry Divisions, Fort Drum, NY	262	231	214
Light Infantry Division, Alaska	73	99	83
Strategic Defense Initiative	10	125	18
Navy Strategic Homeporting	97	273	197
NATO Infrastructure	232	396	412
TRIDENT Basing	168	131	52
PEACEKEEPER Rail Garrison Basing	-	4	58
Guard and Reserve Construction	480	579	522
Base Closure	-	45	48

Major Equipment Procured for Guard/Reserve

	FY 1987	FY 1988	FY 1989
Army			
UH-60 Blackhawk Helicopters	5	3	4
Bradley Fighting Vehicles	-	9	16
M119 Howitzer	-	54	36
High Mobility Multipurpose Wheeled Vehicles (HMMWV)	2,020	52	372
5 Ton Trucks	-	738	1,840
Navy			
UH-60 Blackhawk Helicopters	-	3	3
5.56mm Carbine	-	278	836
Air Force			
Flightline Tow Tractors	58	10	34
Trucks	720	781	497
Runway Cleaners	35	83	61

ACQUISITION IMPROVEMENTS

- **Cost Growth for Major Weapon Systems:**
  - end of CY 1980 14%
  - end of CY 1985 <1%
- **Multiyear Procurements:**
  - FY 1982-FY 1987:
    - 46 multiyear contracts approved;
    - $7.7 billion in projected savings.
  - FY 1988/FY 1989:
    - 9 multiyear programs requested;
    - $1.0 billion in anticipated savings.
- **Increased Use of Competitive Contracts:**
  - FY 1981: 40 % of all contracts awarded competitively
  - FY 1986: 79 % of all contracts awarded competitively
- **Spare Parts Acquisition Initiatives:**
  - Savings of $3.8 billion FY 1984 - FY 1986.

DOD EFFORTS TO CURB WASTE, FRAUD AND ABUSE

CONTRACT AUDITS:

• Estimated savings	$9.0 billion

INTERNAL AUDIT OF DOD ACTIVITIES:

• DOD, IG estimated savings (since FY 1982, 700 reports)	$4.8 billion

INVESTIGATIVE ACTIVITIES:

• Recoveries, restitutions, fines, and penalties	$100 million

FY 1987 PERSONNEL, READINESS, AND CRITICAL PROGRAMS SUPPLEMENTAL

($ in Millions)

"MUST PAY" BILLS and READINESS	**1,284**
Fully Funded 3 Percent Pay Raise	100
Overseas Station Allowance	342
CHAMPUS	340
Training/Related Support	262
Ammunition	240
CONGRESSIONAL PRIORITIES	**1,010**
Special Operations Forces (SOF)	330
Chemical Demilitarization	500
Operational Test & Evaluation	120
NATO Initiatives	60
STRATEGIC DEFENSE INITIATIVE	**500**
TOTAL BUDGET AUTHORITY	**2,794**

Chairman CHILES. Senator Johnston.

Senator JOHNSTON. Thank you, Mr. Chairman.

Mr. Secretary and Admiral Crowe, welcome to the committee. I think we are off to a good start this year.

Secretary WEINBERGER. I am sorry, Mr. Chairman. Admiral Crowe has a short statement. I wonder if that would be possible.

Chairman CHILES. Certainly.

Admiral CROWE. Mr. Chairman, I submitted a statement for the record. We are prepared to summarize it.

Chairman CHILES. We will take your full statement in the record and be happy to have you summarize it.[1]

Admiral CROWE. If you are interested in it. I apologize, Senator, for putting off your questions.

Chairman CHILES. We await it eagerly.

Senator JOHNSTON. I was going to say something nice about you.

Admiral CROWE. That is very unusual.

STATEMENT OF ADM. WILLIAM J. CROWE, JR., USN, CHAIRMAN, JOINT CHIEFS OF STAFF

Admiral CROWE. Well, Mr. Chairman, I welcome this opportunity to testify on the budget and also to report to you on the overall condition of our military establishment.

As I suggested, I would like to just summarize my statement. Last year was my first participation in the budget process, and I watched the Congress cut back the President's request rather dramatically. In the process, there was a great deal of talk about both fiscal reality and political reality. So it seemed to me appropriate this year in my written statement, to return to fundamentals and to get something in the record about military reality, because I think that is also an important part of this equation.

My full statement focuses on four broad subjects: linkages between strategy and the military; the East-West balance, including a rather compressed net assessment of the military situation around the world; the President's budget; and a very brief look ahead.

NATIONAL SECURITY STRATEGY

Our national security strategy seeks, first and foremost, to achieve fundamental and constructive goals; that is, to preserve our independence, our freedom of action, and our territorial integrity in concert with other like-minded nations. While World War II preserved us from the clutches of fascism, it certainly did not eliminate all threats to freedom or open up a new era of tranquility.

Since 1947, the free world has been engaged in an intense political competition with the U.S.S.R. and its followers. In turn, this contest has forced the United States to look to its physical defenses, which is, after all, the subject of today's hearing. With time, deterrence became the centerpiece of our post-war strategy, coupled with collective security arrangements, a strong forward strategy or a strong forward defense in Europe and Asia, robust central reserves supported by global mobility, and vigorous efforts to engage Moscow in productive arms reductions dialogue.

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[1] See p. 138.

Our strategy of deterrence has never contemplated that we would match the Soviets man for man or weapon for weapon on any field of battle. Rather, we have relied upon the "quality" of our peacetime forces—that is, people, platforms, munitions—to give us the initial edge, i.e. to allow us either to manage crises so that they will not escalate or spread, or, in the alternative, to blunt major attacks on our interests and then form a nucleus around which we can quickly expand if necessary.

I would submit that that is an appropriate policy for a democracy, but I would also suggest that it leaves very little room for day-to-day miscalculations. More importantly for our purposes here, from a military perspective it means that seemingly small reductions in our peacetime capability may result in large increases in the military risk. It is imperative that this fundamental relationship be understood as we consider the budget.

STRATEGY GOVERNED BY EAST-WEST BALANCE

Our strategic calculus is of necessity governed by the East-West balance. I think a number of factors are important to consider, and I have discussed them in some detail in my written statement. Geography tends to provide a mixed picture of strengths and weaknesses for both the Soviet Union and the United States. On the other hand, "economic potential" clearly favors the West. Similarly, the security contributions of United States allies in Europe and Asia greatly outweigh those of Moscow's partners.

Still, overall trends in the military balance give us little cause for optimism. The nuclear equation has been dicey for a number of years and remains so as a result of Soviet persistence in fielding a host of offensive and defensive strategic systems. Equally disturbing, Moscow is moving ahead with conventional force modernization at a pace which not only protects its traditional numerical superiority, but also increasingly threatens the qualitative advantages that we enjoyed in the 1950s, the 1960s and the 1970s. Russian surrogates are also profiting from the Kremlin's vigorous efforts and are more heavily armed now than at any time since World War II.

Significantly, I see no slackening in the Kremlin's military investments. By their own admission, such expenditures will continue on an upward slope just as they have for the last 40 years. In my view, these and other indicators strongly suggest that, in the military competition with the U.S.S.R., we are engaged in a full-fledged marathon, not a wind sprint. Some people would not agree with that, of course.

I recognize that this committee is interested in more than trends. You want to know where we stand today vis-avis our number one potential adversary. Now, Mr. Chairman, you mentioned in your opening statement that real defense was measured by our capabilities. I accept that, but it also is measured, more importantly, from a military planner's perspective, by our capabilities vis-a-vis what our potential adversaries are doing. That is a very, very important part of the equation in the calculus.

STRATEGIC FORCES

There is no question that in the static sense the Soviets have reached strategic parity or better. They have clear superiority in ICBMs and megatonnage, as well as in survivability measures. This is one of the major shifts in the balance between the two superpowers wrought in recent years.

On the other hand, the U.S. ballistic missile submarine force is less vulnerable than the Soviet counterpart, and we have a more effective bomber force capable of penetrating Russian defenses today. I remain confident that these capabilities, combined with programs which the President has proposed, will continue to give the Kremlin serious pause for thought.

Our strategic modernization programs, and I am referring primarily to the MX, the D-5, the B-1, the ATB, small ICBM, C3 enhancements and SDI, will prepare us for the long haul, keep pace with Soviet improvements offensively, and correct our more glaring C3 deficiencies. I must re-emphasize that to keep the nuclear threshold high and to continue to deter a direct nuclear attack on the United States and our allies, we must stay the course with the President's modernization programs. Of necessity, this must be one of our highest priorities.

OVERALL MARITIME PICTURE

It is the second major shift in Soviet military strength. Over a period of four decades, the American Navy has moved from clear superiority on the seas to a slim advantage and then parity in overall comparisons to the Soviet fleet. In the last few years, we have reversed these trends, particularly in shipbuilding. Today, our carrier battle groups combine naval arms to a degree no other nation in the world can match, with demonstrable utility in peace, crises, or all-out war. Similar advantages can be found in our quieter submarines, amphibious forces, underway replenishment capability, superior personnel, quality training and the support we receive from allied navies.

On the other hand, we see the Soviets continuing to move ahead smartly with their sea control/sea denial doctrine, with a constant stream of new warships coming off the waves, and with associated advancements. And I am referring to anti-ship missiles, over-the-horizon targeting capabilities, sophisticated nuclear power plants, deep sea technology which allows them to build the deepest diving submarine in the world, and general ASW capability improvement.

As regarding the overall maritime picture, I believe that we today enjoy a slim margin of superiority on the high seas, but I must emphasize that positive and persistent action will be required to maintain this edge against a very determined adversary who is continuing to build and shows no sign of abating building. We must never forget that from a strategic standpoint, our ability to prevail at sea is the cornerstone of our global strategy.

NATO/WARSAW PACT BALANCE

Now, let me turn to the NATO/Warsaw Pact balance. Major trends, unfortunately—and this is not a comforting thought, but it is true—are generally adverse to NATO. It is not that we are without strengths. For example, I credit many of our allies on the central front with very effective ground and tactical air forces, and I would certainly echo your thought, Mr. Chairman, when you say that Bernie Rogers and Glenn Otis are now talking about winning in certain areas for the first time. We have had great improvements.

AMMUNITION RESUPPLY CAUSES SERIOUS CONCERN

Additionally, the United States and its allies in this theater have made great strides in night warfare and combined arms tactics, exploiting the inherent advantages of tanks, helicopters and antitank missiles. From the U.S. standpoint, the sustainability of our forces in Europe has increased markedly, but the stocks of a number of our allies are still a cause for serious concern. In fact, I should say very serious concern.

Senator DOMENICI. The what, Admiral? Would you state that again?

Admiral CROWE. The stocks of a number of our allies who have not kept pace——

Chairman CHILES. Ammunition resupply you are talking about?

Admiral CROWE. Yes.

Chairman CHILES. Spare parts, et cetera?

Admiral CROWE. Yes; but primarily munitions, Mr. Chairman.

The primary problem is sheer numbers on the Soviet side plus distinct Soviet advantages in chemical munitions, theater nuclear forces, and sustainability on the field of battle. These superiorities were vividly displayed by Secretary Weinberger's chart comparing production of United States and Soviet military equipment.

NATO HAS QUALITATIVE EDGE IN TACTICAL AVIATION

On the plus side, the NATO qualitative edge in tactical aviation, while somewhat diminished, has not disappeared, in my view. It is not clear, however, what this will mean against the numerical advantages of the Soviet air forces, both offensive and defensive, which runs in the neighborhood of two to one. I have complete confidence that the quality of our pilots and weapon systems would permit us to exact high exchange ratios in the air, but overcoming the impressive numbers of Russian medium-range bombers, fighter/bombers, interceptors, and surface-to-air weapon systems will be a sporty course, at best. In essence, the outcome is difficult to predict.

To put all of this into perspective, NATO's capabilities continue to deter in Europe. Surely, the prospect of having to fight 16 nations at once remains a sobering one for the Kremlin. But if, for some reason, war breaks out, maintaining a successful forward defense will be a "near thing" under the best of circumstances. Barring a major change——

Chairman CHILES. Right there, Admiral, if I might ask you, we have talked about whether our strategy applies with what I requested. We put on the table at Reykjavik a proposition to go to zero ballistic missiles in Europe within 6 years.

Admiral CROWE. Ten years.

Chairman CHILES. Ten years. All right. Do we have the capability to sustain and win in Europe on a conventional basis? Our rationale of our deterrence has always been that we had tactical nuclear weapons if we had to use them.

Admiral CROWE. Well, you understand, that proposal does not do away with nuclear weapons, Mr. Chairman. That was ballistic missiles.

Chairman CHILES. All right.

Admiral CROWE. We would still have nuclear capability.

Senator JOHNSTON. I understand that the President did put on the table doing away with all strategic nuclear weapons.

Admiral CROWE. That is not my understanding, Senator, but you are above my pay grade here.

Chairman CHILES. Well, let us just say even ballistic missiles. What I am asking you is have we matched that kind for proposal for strategic ballistic missiles with what we are saying we would need on the conventional side in Europe?

Admiral CROWE. In these budgets?

Chairman CHILES. Yes, sir.

Admiral CROWE. Oh, no, sir. Of course not.

Chairman CHILES. That we have not?

Admiral CROWE. That proposal is just what it says, Mr. Chairman—a proposal. It is a long way from the cup to the lip, and we are talking about real world defense here, not what may happen. The arms control dialogue suggests that we are a long way from anything positive or tangible.

Chairman CHILES. I think we are a long way from putting a proposal like that on the table if we do not know what we would be talking about on the conventional side, and our allies willing to beef up supply.

Admiral CROWE. Well, my final thought with regard to NATO is that barring a major change in the dynamics of the competition, I would argue vigorously that NATO could no longer hope to offset Pact numbers merely by improving the quality of its equipment or relying on the dedication of people defending their own territory.

Please understand, Mr. Chairman, I am talking about NATO as a whole in this particular assessment, not just necessarily the United States.

EAST ASIA

Let me move to East Asia. I find a mixed picture of challenges and opportunities. The challenge is the persistent growth in Soviet air and naval power which has been dramatic in that part of the world, plus Moscow's strategic partnership with both Vietnam and North Korea.

Opportunities arise from China's now independent and constructive stance in regional affairs, unresolved tensions, which tie down Soviet forces along the Sino-Soviet border, and the support we receive from our own allies, such as South Korea, Japan and the Philippines.

With respect to regional balances, combined United States-South Korean forces continue to provide a very respectable deterrent to any attack from the north. Should Pyongyang be tempted, for any reason, to assault the south without Soviet support, I would suggest that U.S. augmentation, especially our air power, will make the difference in deterring or, if necessary, turning back the enemy.

Certainly, the health of our alliances in Asia will be crucial and deserves our constant attention. This argues also that we must constantly demonstrate that we can successfully confront the Soviets in the Western Pacific and, in the event of war, that we can keep open the sea lines of communications to that part of the world.

My overall assessment would be that, in general, the Pacific picture is encouraging. But, given the Kremlin's increasing focus on Asia, there is a great deal yet to be done there before we can feel totally secure.

POWER PROJECTION

In power projection. In power projection capabilities, the Soviet Union clearly has advantages along its own borders—witness events in Afghanistan. Similarly, Moscow has deployed considerable capability in the Caucasus which can rapidly be brought to bear on both Iran and the Gulf Region.

Additionally, the Kremlin has developed in its own fashion a substantial capability to project power in the more distant Third World: arms sales to clients delivered by civil as well as military transport, covert operations, and intervention in areas where U.S. action is not anticipated.

The United States has also made considerable strides in improving its posture in South Asia and its ability to deploy to that part of the world. But we should be under no illusions. While we still retain a distinct advantage over the Soviets in general strategic lift—and I am talking about both air and sea lift—and our ability to project force over long ranges, we retain that ability to project force over long ranges. But distances and harsh operating environment of South Asia pose a considerable challenge, a challenge we are gradually meeting, but one that we yet have not met, and we need more capability to do just exactly that.

Aside from the area of South Asia, I am confident that in a direct confrontation, U.S. forces, because of our lift advantages, could prevail over Soviet troops operating far from their homeland. The only question is whether we may move soon enough in response to a challenge.

SPECIAL FORCES

I would like to say a word about special operations forces. In my statement for the record, you will find a brief discussion of the role of United States and Soviet special operations forces and some comments on the challenge of low intensity conflict.

Today, our special forces are very good at the business of counter-terrorism, probably the best in the world. We are, however, still striving to fit the special forces into an overarching strategy to cope with the multiple dimensions of low intensity conflict. The challenge is twofold: One, to develop more focused organizations, and here genuine progress is being made as we implement last year's legislation on that subject; and, secondly, to procure the necessary specialized equipment.

Overall, I believe we are building a credible and effective capability against state-supported terrorism, subversion, and other forms of indirect aggression against the West. But a great deal of hard, constructive work still lies ahead in this area.

In summary, it is clear that the investments made in the last 8 years have materially improved the net assessment, my own personal net assessment. It is equally obvious that the picture is a dynamic one, that the Soviets are working diligently to improve their position across the board, and that there are still a number of very serious gaps in our military posture. Put simply, we still need a number of years' growth before we can face the future with genuine confidence.

ZERO GROWTH BUDGET ALARMING

I cannot help but be alarmed by the signal which a continuing zero or negative growth defense budget would send both to our allies, in Europe and Asia, and our potential opponents. Such a signal at this time, from where I sit, is not justified by the threat, the international political climate or the military situation. And I am referring to our own military capabilities.

Against this background, the President's defense budget reinstitutes some modest real fiscal growth which the Joint Chiefs of Staff believe is essential to the long-term health of our forces. The proposed budget emphasizes our qualitative advantages, reduces deterrent risks, and avoids dramatic trade-offs which would unduly distort the force structure as we move into the 1990s.

Secretary Weinberger's earlier statement, his annual report, also deal in detail with the fiscal year 1988, 1989 submission. Suffice it for me to say here, the budget continues to provide for increased compensation and personnel benefits; moves forward, albeit at a slower pace, with the modernization of strategic and general purposes forces, includes some growth in NATO force structure; addresses the more pressing sustainability shortages; provides an appropriate balance between readiness and sustainability; and stresses research and development accounts.

While by no means risk-free, the budget is a prudent, carefully crafted approach to maintaining an effective deterrent across the full threat spectrum in a constrained fiscal environment. As the President's principal military adviser, I wholly support his budget and urge the Congress to do likewise.

SECURITY CANNOT BE MAINTAINED BY MARCHING IN PLACE

Looking ahead, I would ask Congress to consider the pervasive impact of recent cuts in spending for defense. With a considerable amount of reprogramming and fine-tuning, we have been able to avoid either a hollow strategy or a hollow force. However, given the narrow margins within which we operate, further cuts could very well provoke a disproportionate change in risk.

No real growth in spending for defense over the next 5 years would, in my judgment, significantly increase our military risks throughout and beyond this decade. I believe an unemotional net assessment of the balance, the military balance around the world, reinforces that conclusion.

Simply put, we cannot expect to remain secure by marching-in-place while the Soviets relentlessly move forward correcting one deficiency after another. That is how we can lose our already slim edge on the field of battle and, in turn, our present ability to deter. We ignore those military realities at our peril.

In essence, I would prefer to see America settle down in the defense debate and to look seriously at where we will be in the 1990s. What is most needed is a consistent and rational defense policy geared for the long run rather than the peaks and valleys which have characterized so much of our peacetime history.

We have a great deal going for us in economic defense potential and in partnerships with the other free nations of the world and in the quality of the people which man your armed forces. But we must take the lead with our allies and set the pace to keep our defenses strong.

I would submit, Mr. Chairman, that if we fail to meet that challenge—and let Soviet-controlled forces dominate the field—then we must be prepared to face a world starkly different and less hospitable than the one we are living in today.

That completes my statement.

Chairman CHILES. Thank you, Admiral.

[The prepared statement of Admiral Crowe follows:]

STATEMENT OF

ADMIRAL WILLIAM J. CROWE, JR., USN

CHAIRMAN OF THE JOINT CHIEFS OF STAFF

BEFORE THE

SENATE BUDGET COMMITTEE

ON

FY 1988-1989 DOD AUTHORIZATION

13 JANUARY 1987

INTRODUCTION

Mr. Chairman and members of the Committee. I welcome the opportunity to appear before you today and report on the overall condition of our military establishment.

A considerable amount of water has passed under the legislative bridge since my testimony on the FY 1987 budget. In that budget the Congress chose to cut the President's defense request dramatically and for the second year in a row to legislate negative growth in our appropriations. Throughout this process I heard a great deal about the "fiscal" and "political" realities that dictated such action, but all too little about the "military" realities we face. This year I believe it is imperative to go back to fundamentals, i.e., to review the strategic landscape and to consider the "military" realities carefully before deciding what resources will be committed to our defense over the next two years. In an attempt to aid this process, I will this morning address four subjects:

- Linkages between strategy, force structure, hardware and people;
- The East-West balance, including capabilities of U.S. and allied forces in comparison with our potential adversaries;
- The President's budget; and
- A brief look ahead.

LINKAGES BETWEEN STRATEGY AND THE MILITARY

To begin, the role of U.S. military forces is shaped by national security policies which have remained essentially unchanged since the late 1940's:

- Preserve the independence, freedom of action, and territorial integrity of the United States;

- Support U.S. and allied vital interests abroad; and

- Encourage an international order in which our freedoms and democratic institutions can prosper.

These policies genuinely describe what our strength, especially our military potential, can do for us in an often violent and turbulent world. The main point to keep in mind is that our military forces contribute to achieving these objectives every day not just when the nation is under direct attack.

Defense Policies

Our military posture is further shaped by some basic themes which have evolved in the post World War II era. We strive to:

- Deter wars rather than fight them. This strategy of deterrence aims to make war or the threat of war too risky for any hostile power or combination of powers to contemplate.

- Optimize our collective security arrangements and forward defense posture through combined defense planning with allies in Europe and Asia and through vigorous security assistance programs. At the heart of this policy is the principle that the capabilities of the whole will be greater than the sum of its parts. In turn, our coalitions present potential adversaries with formidable political, psychological and ideological challenges--as well as enhanced military power.

- Maintain robust central reserves supported by global mobility. Many of our treaty commitments are bolstered primarily by our power projection forces. Indeed, many strategists in and out of the Pentagon now recognize that real-world deterrence depends upon our inherent capability to "get there firstest with the mostest," deal effectively with the threat at hand, and withdraw just as quickly from the scene of action.

- Pursue a vigorous arms reduction policy which seeks equitable, effective and verifiable arms agreements with potential adversaries. For more than fifteen years, we have been trying to engage the Soviets in an agreement which will sharply reduce offensive nuclear arms.

Military Strategy

Historically, the United States has attempted in peacetime to maintain sufficient capability to blunt initial attacks on our own interests and to form a nucleus around which we can expand for major hostilities. In practical terms, this means that we do not attempt to match potential adversaries weapon for weapon and man for man, but to develop quality forces and "edges" (marginal superiorities) that will deter our enemies by keeping their level of uncertainty high or allow Washington to manage crises in a manner that will prevent them from escalating or getting out of hand. In essence, we are betting that in major war we can expand our peacetime forces and bring our total resources (technological, industrial, personnel, economic, political) to bear so that we will ultimately prevail. This is an appropriate policy for a democracy but it also leaves little room day-to-day for miscalculation. More importantly it means that since we operate on the margin seemingly small reductions in our peacetime capability may result in large increases in the risk. It is imperative that the nation understand this fundamental relationship.

Over the course of time, we have followed a number of principles in determining how to build and deploy our forces. For instance, we attempt to:

- Plan in a total force context--i.e., active and reserve forces of the U.S. and its allies, host nation support in forward areas, various types of combat service support from civilian sectors, and allied military enhancements underwritten by our security assistance program;

- Exploit the deterrent value of nuclear forces while avoiding a nuclear war;

- Defend forces in-being against an initial attack at a time and place of the enemy's choosing;

- Emphasize our qualitative advantages--technical, personnel and organizational--to defeat an adversary who will normally outnumber us on the field of battle;

- Expand our forces rapidly in the event of major crises and especially in all-out war; and

- End any conflict on terms favorable to the U.S. and its allies.

Given our built-in pluralism and constrained resources, it is very difficult to bring all these policies and principles together even when you are not worried about static or sagging expenditures for defense.

THE EAST-WEST BALANCE

Cutting across the strategic landscape--and in many respects dominating it--is the East-West balance. In my view, a number of factors are imperative to consider: geography, economic defense potential, allied contributions, and military trends over time.

Geography

Geographically, the Soviet Union has a very large border and airspace to defend--much larger than ours--and a disadvantage in its limited access to the open oceans and non-European friends. For our part, the United States is much more dependent upon its use of international airways and oceans, not only in its daily commerce but also in cementing its far-flung alliances. Thus, geography tends to provide a mixed picture of inherent strengths and weaknesses.

Economics

On the other hand, economic defense potential clearly favors the U.S. and its allies as compared with the Warsaw Pact. Today, for example, our gross national product is nearly twice that of the Soviet Union. Similarly, NATO as a whole continues to outpace the Warsaw Pact by a factor of two-to-one.

Today, we also see the Soviet Union struggling to overcome weaknesses endemic to its system: the difficulties of running a "command" economy with no measure of profit and loss, depletion of their European mineral base, challenges of developing alternative resources in Siberia, lack of discipline among workers, management shortcomings revealed in the Chernobyl disaster, and a host of problems keeping political and economic relations with Eastern Europe on an even keel.

Thus, by general measures of economic strength, the U.S. and its allies are considerably stronger than the Soviet Union and its allies. But how the money is spent also is a critical factor. Like Axis Powers in the 1930's, the Kremlin continues to stress armaments at the expense of all other sectors of the economy.

Allied Contributions

With respect to allied contributions, Western Europe routinely accounts for about 30% of all military expenditures by NATO members and provides about 60% of the active military personnel, as well as 60% of the ground and air combat units. In Northeast Asia, South Korea and Japan also field the bulk of deterrent forces numbering 600,000 and 250,000 military personnel respectively. By comparison, we normally have about 130,000 military personnel stationed, ashore and afloat, in the Western Pacific.

On the other side of this coin, few of our allies have a nuclear deterrent of their own and, in the postwar years, many stressed ground and air capability rather than naval strength in their defense planning. Thus, in the overall scheme of things, it is necessary for the United States to place a high priority on its strategic nuclear umbrella, global maritime superiority and strategic mobility forces.

For its part, Eastern Europe normally accounts for about 15% of all military expenditures by the Warsaw Pact. The USSR shoulders the other 85% and, in turn, dominates the Pact's High Command, military strategy, force structure, and hardware. In this situation, it is relatively easy for the Soviets to achieve economies of scale in military production and standardization of equipment and tactics among Warsaw Pact forces. But they can never be certain that the forces or peoples of Eastern Europe will rally around a call from Moscow. I suspect that this one uncertainty weighs most heavily on the minds of the Russian leaders.

On balance, our allies shoulder a much greater defense burden in Europe and Asia than do allies of the USSR. Of course, we would prefer that many of them do even more and we strongly encourage them at every opportunity. Nevertheless their contributions are most significant and count heavily as a factor in our favor.

Trends in the Military Balance

Still overall trends in the military balance give us little cause for optimism and strongly call for greater U.S. effort.

- Our strategic nuclear deterrent is neither as secure nor as dominant as it once was. Particularly disturbing is the Soviet emphasis on strategic defense --the steady hardening of command and control facilities, a very robust defense against air-breathing threats, and an ABM system with potentially nation-wide coverage. Concurrently, we see their large ICBM force becoming more hardened and mobile, their submarines more quiet, and their bombers more capable of intercontinental missions.

- Soviet conventional capabilities on and around the Eurasian Continent are much greater than they were two decades ago. In these forward areas, we have always been considerably outnumbered by Soviet ground and air forces. Now we are also seeing our qualitative edge erode.

- Soviet surrogates in Asia, Africa, and Central America are more heavily armed and troublesome than they once were. In turn, they are much more inclined to support terrorism, subversion, and greater forms of aggression against their neighbors and the West in general.

While the likelihood of a major Soviet assault on Western Europe is perhaps remote, the coercive threat of Soviet military power will loom over the Eurasian Continent for many years to come. Moreover, the Soviet Government has never departed from policies holding that its allies and surrogates in the Third World must remain strategically subservient to Moscow and that the rest of the world is an open field for destabilizing actions.

Further, we see no slackening in tomorrow's military investments. By their own admission, such expenditures will continue on an upward slope--just as they have over the last four decades. All of this puts an enormous burden on the Soviet economy, but I see no sign that the system cannot sustain such an effort.

In my view, these and other indicators strongly suggest that we must prepare ourselves for a marathon, not a short-term sprint, in the military competition with the USSR. That thought must be a cornerstone of any successful U.S. strategy.

Yet, this is one of the most difficult ideas to get across to the U.S. Congress and the American people. Frankly, our history would argue that where military preparedness is concerned, we are notoriously short-sighted.

Net Assessment of Military Capabilities

Moving on, I recognize that this Committee is interested in more than broad trends in the East-West balance. You want to know more specifically how the capability of U.S. armed forces and those of our allies compare with those of the Soviet Union and its allies.

Strategic Forces

First, strategic forces. There is no question that in the static sense the Soviets have reached strategic parity or better. This is one of the major shifts in the balance between the two superpowers wrought in recent years. They have clear superiority in ICBM's and overall megatonnage. Hardened communications (C3) and passive defense measures give them a survivability U.S. forces do not yet have. Likewise, the Soviets are further along in shifting to mobile missiles and are posturing themselves for a possible ABM breakout.

On the other hand, the U.S. ballistic missile submarine force is less vulnerable than the Soviets and we have a more effective bomber force still capable of penetrating the USSR. Moreover, the President's strategic modernization program if fully implemented--MX, D-5, B-1, ATB, C3 initiatives and Small ICBM--will prepare us for the long haul, keep pace with Soviet improvements offensively, and correct our more glaring deficiencies.

Thus all things considered, I am relatively confident that strategic forces and programs which are being proposed will deter a direct nuclear attack on the U.S. and our allies. But I must reemphasize, for that judgment to continue to be solid, it is imperative to stay the course with our strategic modernization programs.

Maritime

The maritime picture is the second major shift in Soviet strategic policy.

Throughout the immediate postwar period the U.S. enjoyed undisputed mastery of the seas, but the Kremlin was not easily discouraged. By the late 1970's the Russian Navy had made tremendous inroads into our margin of superiority and the trends were even more alarming. We have now reversed these curves--particularly in overall shipbuilding--but the Soviets are on the high seas to stay.

Our main concern is a "blue water" Russian fleet pushing its area of operations further and further from the homeland. By stretching our forces and tactics to the limit and working harder to understand Soviet naval thinking, we still hold a slim margin of superiority on the high seas. But whether that margin holds up will depend, in part, on our reacting quickly to indications and warnings and our willingness to match their forces and efforts. As an example, we must take full advantage of the superiority of our nuclear attack submarines and carry the battle to the Soviets in the forward areas. Without such pressure, we could expect to see a major breakout by Soviet naval units and formations on to the sea lines of communications.

While we still enjoy an advantage in seaborne air, amphibious forces, and underway replenishment, and in support we receive from allied navies, a significant challenge on the high seas is growing out of Soviet success in:

- Deploying very advanced anti-ship missiles which are constantly improving;

- Increasing their over-the-horizon targeting capability by exploiting space;

- Improving submarine propulsion (speed and quietness) and metallurgy (depth); and

- Steadily improving their ASW capabilities.

In essence, we cannot afford to relinquish naval superiority to the Soviets. To do so would jeopardize our coalitions, economic and trade dependencies (which are now necessary in war as well as peace), and capabilities to project our power overseas. Our ability to prevail at sea is a cornerstone of our overall strategy.

NATO/Warsaw Pact

Turning to the NATO/Warsaw Pact balance, major trends are generally adverse to NATO. I have already spoken to the implications of strategic parity. Moreover, we have essentially no deterrent to chemical warfare in NATO or elsewhere--this is a crucial weakness when confronting the USSR. Reinforcing this trend has been the extensive Soviet modernization, expansion, and reorganization of their theater forces.

Further, the Soviets are better able than NATO to conduct theater nuclear war in Europe. Today they possess a pronounced superiority in numbers of intermediate nuclear forces, both long- and short-range. Similarly, our one-time lead in battlefield nuclear systems has disappeared.

In light of these developments, conventional forces assume an added significance. The Soviets have always had imposing ground forces but the gap in numbers of modern weapons continues to widen. In ground equipment they lead the U.S. and also NATO in virtually every category by ratios ranging from 1.5 to 1 to 6 to 1. Moreover, we have lost our lead in surface-to-air missiles and anti-armor capability. Similarly, NATO's qualitative edge in ground systems may have eroded somewhat. On the other hand, NATO ground forces on the Central front have made progress in the use of combined arms and in the fielding of modern equipment. Similarly, the sustainability of U.S. forces has improved markedly over the last few years. Unfortunately, the stocks of certain munitions among the allies have not improved appreciably and could be exhausted too quickly.

On the plus side, the NATO qualitative edge in tactical aviation while somewhat diminished has not disappeared. It is not clear, however, what this will mean against the numerical advantages of the Soviet air forces (offensive and defensive) which run in the neighborhood of 2.0 to 1. I have complete confidence that the quality of our pilots and weapon systems would permit us to exact high exchange ratios but overcoming the impressive numbers of Russian medium-range bombers, fighter bombers, interceptors, and surface-to-air weapon systems will be a sporty course. The outcome is difficult to predict.

We will, of course, have the support of our naval forces in Europe and, as I mentioned earlier, the Soviets have yet to surpass our lead.

To put all of this into perspective, NATO capabilities are still deterring a war in Europe. Surely, the prospect of having to fight 16 nations at once remains a sobering one for the Kremlin.

But if, for some reason, war breaks out, maintaining a successful forward defense will be a "near thing" under the best of assumptions. Barring a major change in the dynamics of the competition, NATO can no longer hope to offset Pact numbers merely by improving the quality of its equipment or relying on the dedication of people defending their own territory.

In the final analysis the military balance in Europe is not encouraging and needs a great deal of tending--politically as well as militarily.

East Asia

Until the late 1960's Moscow paid little attention to the defense of its eastern provinces and its strength in the Western Pacific. With the PRC's breakaway from the Soviet orbit and the burgeoning affluence of East Asia, the Kremlin began to build up its forces in the region--not by drawing down in Western Europe, but by commissioning new units and increasing defense production to help them.

Overall, the balance on the Chinese border favors the Russians in every way except manpower and as yet the Chinese have been unable to turn things around--preferring to put their current priorities elsewhere. The one exception is Chinese nuclear capability which provides "minimal deterrence" of a sort.

Nevertheless, China looms large in the Kremlin's calculations--witness the gradual buildup from 20 to 50 Soviet divisions on the Chinese border.

On the Korean Peninsula, Pyongyang has made a determined effort to outstrip the South's forces. Besides this general buildup several recent initiatives are particularly worrisome--the relocation of a number of 2nd echelon divisions close to the DMZ and recent emphasis on improving special operations forces both quantitatively and qualitatively. However, as long as North Korea is not directly assisted by the Soviet Union, United States augmentation--especially our air power--should make the difference in deterring or, if necessary, defeating the North. The fact remains, however, the Peninsula is an unstable focal point with a significant threat of major war lingering on the horizon.

In the context of global hostilities, the East Asian area presents both opportunities and challenges to U.S. planners. We have significant leverage against Soviet naval and air forces in the region which both reduces the threat to our sea lines of communication, and constrains the Kremlin's ability to accomplish its strategic goals in the Far East.

Further, our political relationships generally work in our favor. It is clear that PRC forces tie down substantial Soviet ground and air deployments in the region and that Peking puts considerable stock in its U.S. tie. In a similar vein, Japan is a pillar of U.S. strategy in the Pacific. Without Japanese cooperation, it would be difficult to bottle up the Russian fleet, augment South Korea, and find sufficient bases to support continuing operations against the Soviets. Likewise, the health of the U.S.-Philippine relationship, politically and militarily, impacts heavily on the regional balance. Obviously, the firmness of U.S. alliances will rest to a great degree on our ability to successfully confront the Soviets in the region and, in the event of war, to keep open our sea lines of communication to the Western Pacific.

While predicting what the Soviets will do is a hazardous business, I am inclined to believe that any U.S.-Soviet confrontation in the Pacific will take its lead from events in Western Europe or elsewhere. This means that we would most likely be fighting a containing action as well as supporting our Pacific allies. While the prospects for achieving our objectives in Asia are encouraging, there is clearly a great deal to be done before we can confront the future with confidence.

Power Projection

Turning to power projection, the Soviets have long been able to project military power successfully adjacent to their borders. Basically the Russians' continental location and large resource base gives them an asymmetrical advantage vis-a-vis the U.S. when applying force in Western Europe and along their immediate periphery--witness events in Afghanistan.

In the last decade the Kremlin has increased its ability to project forces, employing cargo aircraft, naval units and non-military shipping, although Washington continues to enjoy a distinct advantage where long range lift is concerned. However, the Soviets have developed a style of power projection that avoids confrontation with U.S. units, e.g., through the use of Cuban proxies, arms sales to clients, covert operations, and intervention in areas where U.S. action is not anticipated. I am generally confident that in a direct confrontation, U.S. forces would be able to defeat Soviet troops operating far from the Soviet Union. In peacetime, however, we will continue to see the Soviets selectively intervene (projection of influence) in regional conflicts around the globe where they believe the calculus genuinely favors them.

Special Operations Forces

Because they so often operate behind the scenes, straight one-on-one comparisons of our Special Operations Forces and Soviet "SPETSNAZ" are difficult to derive and sensitive to portray in an open fashion. Nevertheless, several points are worth noting. Both sides depend upon such forces to complement conventional forces in general war planning. But the Soviet side tends to use its SPETSNAZ more routinely in low intensity conflict as during the Czechoslovakia invasion of 1968 and in the current Afghanistan campaign. Their capability for covert and clandestine operations also fits into the Kremlin's policy of keeping pressure on the West through state-supported intimidation, terrorism, and subversion--and making sure that no surrogate ever gets out of the Soviet camp. In short, the Brezhnev doctrine and SPETSNAZ go hand in hand.

Against this background, there is no question that our SOF have become very good at the business of counter-terrorism. In 1981, our capability was very limited; now we probably have the best in the world. But this is a rather narrow field and we are still groping to fit our SOF--and other forces--into an overarching strategy to meet the threat of low intensity conflict. Further progress should be possible with more focused organizational arrangements, including the new Special Operations Forces Command, and increased emphasis on procuring the specialized equipment and training for these types of operations.

Overall, I believe we are building a credible and effective capability against state-supported terrorism, subversion, and other forms of indirect aggression against the West. But, a great deal of hard, constructive work still lies ahead in this area.

Net Assessment

In summary, it is clear that the investments made in the last 8 years have materially improved the foregoing net assessment from the U.S. standpoint. It is equally obvious that the picture is a dynamic one, that the Soviets are working diligently to improve their position across the board, and that there are still a number of serious gaps in our own posture. On balance, we still need a number of years' growth before we can face the future with confidence. In particular, I cannot help but be alarmed by the signal which a continuing zero or negative growth defense budget would send to both our allies and potential opponents in Europe. Frankly, such a signal at this time is not justified by the threat, the political climate or the military situation.

THE PRESIDENT'S BUDGET

Against this background, the President is starting anew with the 100th Congress by proposing three percent real growth in defense spending against the FY 87 baseline.

The Joint Chiefs believe that the budget for FY 1988-1989 supports the nation's strategy and will reinstitute modest real fiscal growth so necessary to long-term health. The Chiefs and CINCs participated in the formulation of the budget and while it is by no means risk-free they are satisfied that appropriate compromises and trade-offs have been struck at the resource level which has been set. The budget continues the modernization of the equipment for our forces both nuclear and conventional; includes growth in naval force structure; addresses our more pressing sustainability shortages; provides an appropriate balance between readiness and modernization; preserves the kind of quality manpower which is the backbone of our forces; and, with an eye to our reliance on quality technology, continues to emphasize research and development accounts. Secretary Weinberger's statement has addressed each of these areas in detail. Consequently, I will only mention some of the more significant items.

Military Personnel

As I noted last year, our most precious asset is quality personnel--the cornerstone of our military establishment. This year, the President's budget continues support for adequate levels of compensation accompanied by a modest increase in military pay and additional funding for family housing. This action will sustain a personnel picture which overall remains healthy.

Too often, we are inclined to count people as the intangible factor in the military balance. So I believe it is useful to cite one area where your support has paid extremely high dividends. We are the best in the world at operating and supporting complex weapon systems under night/all-weather conditions. I see this in all of the Services and count it as one of our strongest cards in managing crises and deterring our adversaries. It all flows from the talent, high morale, and competitive spirit of our officer and enlisted ranks.

Strategic Modernization

The Chiefs have consistently made strategic modernization their number one priority. Our TRIAD of strategic nuclear forces is the umbrella under which all our deterrent forces operate and undergirds the security policies of our allies as well. In the face of unrelenting Soviet efforts to modernize their strategic weapons across the board, we have no choice but to refurbish all three legs of the TRIAD. The MX, Small ICBM, Trident, D-5, B-1B, ATB and accompanying C-3 programs are designed to give us an updated deterrent which will see us into the next century.

In a similar vein the JCS support the President's Strategic Defense Initiative which will determine whether an alternative to sole reliance on the threat of nuclear retaliation is feasible. It is both prudent and moral for the United States to explore means for ending the dominance of offensive ballistic missile weaponry.

Concurrently, the JCS strongly applaud efforts by the President to achieve progress in arms reduction negotiations. While I believe there are some encouraging signs, I do not see any immediate breakthrough in the offing or any reason to relax our strategic modernization initiatives. Negotiations are not a substitute for force modernization; rather negotiations and our modernization efforts are mutually reinforcing.

Conventional Force Modernization

It should be obvious from the comparison of U.S.-Soviet forces that we have some pressing needs in our conventional forces which must be corrected if we are to move into the 1990's with confidence. The number one priority is to maintain our qualitative edge on the field of battle and the President's budget takes a positive step in this direction--in both procurement and R&D funding.

While we have made great progress over the last few years, it is also important to stress that we are only mid-stream in the conventional force modernization process. To cite some expected end FY 1987 figures:

- About 25% of the Army's active mechanized battalions and 40% of its tank battalions will be re-equipped with the Bradley Fighting Vehicle and M1;
- From 50% to 65% of our tactical air wings will have received new fighter/bombers;
- Some five out of fifteen carrier battle groups will have AEGIS; and
- About 36% of our submarine force will be operating basic or improved versions of the 688 Class.

More progress will be made as equipment currently in the pipeline reaches our combat forces. But it should be clearly understood that we are stretching out and, in turn, delaying the modernization effort.

As explained in the OMB Budget Summary this is a direct consequence of fiscal austerities and, in some cases, a deliberate decision to buy more modern munitions and fewer platforms. Only in FY 1989 does procurement in general resume an upward slope and that, of course, is contingent upon Congressional approval of the President's two-year budget request. The bottom line is that many of our active and reserve units will remain behind the power curve in quality, particularly as reinforcements for NATO.

Chemical Warfare

Of special note are the requested funds for chemical weaponry. These programs are necessary to offset a serious disadvantage on the battlefield and to counter offensive and defensive asymmetries strongly favoring the Soviet Union. From the perspective of the American fighting man in the field, it is difficult to overemphasize this request.

Special Forces and Low Intensity Conflict

With respect to Special Operations Forces this budget continues to place considerable emphasis on procuring equipment and weaponry. There is increasing recognition of the value of these specially tailored assets in today's world. In turn, there is a new determination to see that not only organizational but equipment deficiencies are corrected and that these forces are brought to an even higher state of readiness. The requested funds for SOF equipment will pay a high return in capabilities desired by both the President and the Congress.

Sustainability

The FY 1988-89 budget proposes to continue the trend of the last few years in improving our sustainability which includes war reserve stockpiles (munitions and spares), transportation capabilities, and industrial surge capacities. We worry about potential "war stoppers" or their impact on the theater nuclear threshold.

In the past four years, funding for ammunition has grown by over 25 percent; spare parts funding has doubled; and ammunition inventories of all Services have improved substantially. In Europe, for instance, ground ammunition tonnage is up 18 percent, and it has almost doubled in the Pacific. Munition deficiencies which plagued us for years are improving steadily, but at the current rate of expenditures, it will be several years before we can near our goals and breathe easier.

We simply must stay the course if we want a genuinely sustainable force as well as a modern and well-trained one. Otherwise we will be spending a great deal for modern equipment with one hand and then reducing its effectiveness with the other.

Budget Overview

The peacetime strategy and defense spending of the United States seek to maintain the cutting edge of our deterrent forces, active and reserve, while counting on our economic and mobilization potential to cope with any clear and present danger to the U.S. and its allies. Everything about this deterrent stance hinges upon the quality of our people, hardware, munitions, and logistic support.

Overall, this budget addresses adverse trends in the overall balance, stresses our qualitative advantages, reduces deterrent risks over time, and avoids the dramatic trade-offs which would distort the force structure as we move into the 1990's. While by no means risk-free, the President's budget is a prudent approach to the problem of maintaining an effective and balanced deterrent across the full spectrum of potential hostilities. As the President's principal military advisor, I wholly support the defense budget for FY 1988 and FY 1989, and I urge the Congress to do likewise.

LOOKING AHEAD

Looking ahead, this may well be a critical year in the national security debate. Recently mandated, across-the-board cuts in funding and officer strength have slowed our progress in achieving force goals; stretched out force modernization; thinned out some of our combat units in hardware or people; left us with still inadequate stocks of modern munitions; and resulted in a growing backlog of equipment and facility maintenance.

Against this background, a considerable amount of reprogramming and fine tuning has managed to avoid either a hollow strategy or a hollow force--but the overall trends remain a matter of serious concern to the JCS and the CINCs. We may be able to live with one or two years on a flat or descending appropriations curve, but we will eventually pay heavily for several years of zero or negative growth. At this point, it is difficult to forecast the specific impacts. But given the Soviets' steady progress and the narrow margins inherent in our defense policies, small reductions in our capabilities could very well provoke a disproportionate change in the risk. Our experience has confirmed that time and again.

If confronted with no real increase in defense spending over the next five years, for example, it is my judgment that our military risks will increase throughout this decade (possibly sharply) and into the 1990's. Primarily, this is a function of stretching things out, delaying improvements in a total force context, and living with sustainability problems we should be solving at a steady pace. Frankly, it's a pure function of the U.S. marching-in-place or making heavy trade-offs which will sacrifice some part of our structure while the Soviets move forward in their customary fashion, correcting one military deficiency after another. That's precisely how we can lose our present ability to deter and our already slim edge on the field of battle.

In essence, I would like to see America settle down in the defense debate--start looking at where we will be in the 1990's. What is most needed is a consistent and rational defense policy geared for the long run rather than the peaks and valleys which have characterized so much of our peacetime history. We have a great deal going for us in economic defense potential and in partnerships with other free nations of the world. But we must take the lead and set the pace in this long-term military competition with the USSR. If we fail to meet this challenge--and let the Soviet-controlled forces dominate the field--then we must be prepared to face the consequences of a world starkly different and less hospitable than the one we are living in today.

Chairman CHILES. Senator Johnston, I have called on you a couple of times.

WISH LIST VERY REALISTIC

Senator JOHNSTON. I wanted to say something nice about the Secretary and Admiral Crowe, and so I will in saying that, first of all, I want to congratulate you for being off to a good start, first by having a budget whose overall number is something that is within the realm of reason. It is amazing how close the tolerances are between the high number and the low number this year as compared to past years.

The wish list in past years has been so big that everybody thought it was unrealistic. This year I think it is very realistic, and I congratulate you for that.

Second, I caught your interview last night, Mr. Secretary, on MacNeil/Lehrer, you and Senator Nunn, and there was an amazing degree of sort of a love feast between you two, agreement on various things.

Having said all those nice things, let me ask a few questions because my concern with the military budget—well, really with the military posture is very great, and it is not caused by the numbers. Let me say I tend to be in the strong defense group, wherever the numbers lead on that, but I tend to be friendly toward a strong national defense.

HARD CHOICES MUST BE MADE

But the problem I find, Mr. Secretary and Admiral Crowe, is that in the past we have not made the hard choices. We have sort of built everything that comes along. We have built a lot of ideological machines. By ideological machines, I mean like the B-1 bomber which I think is the Edsel of the 1980s; the MX missile which is deployed right in the window of vulnerability, totally indefensible, it seems to me; and various other things which I will not mention in great detail, except to say that some of those mistakes have already been made, and I guess they cannot be undone. But what we can do is recognize that, for the future, we are simply going to have to make some choices, even within the numbers, Mr. Secretary, that you put up there for your numbers of what you plan in future budgets.

Even if you got those numbers—and you know how the budget process is; you always ask for what you think is what you want plus a little bit so you have a little bit of bargaining room and you usually get a little less. But even if you got all of it, you would not be able to fund all the programs that you want to fund. There is just no way they fit in there, so we have got to make some choices.

And I would like to suggest that we begin, first of all, by talking a common language, and by that I mean that we jointly recognize what the numbers are. And I would hope that in the future our staff and DOD staff can work together as to what the real numbers are in terms of past budgets.

I mean, we simply do not believe, our staff does not, that there was a negative 4.2 the year before last or a negative 2.5 this year. We think it is more like zero real growth. And I think it is unfortunate to get off on little eddies and tangential things like whether it is zero or whether it is 2.5. I think we ought to be able to agree on the numbers.

AFFORDABILITY MUST BE LOOKED AT

Second, I think we need to look at some of these systems and reason together about what we can afford. Now, some of the things I am looking at are like the LHX. It looks like it might be a $40 billion program. I think we need to look at that system. I think we need to look at the MX. And I suspect it is already going to be looked at by the Congress.

We need to look at those two aircraft carriers. We need to look at all the numbers of aircraft we have. I think we need to look at the kind and nature of our NATO commitment. Can we afford as many dependents in NATO as we have? Can we cut down that commitment somewhat? Recognizing that even if we get what you are asking for, we are going to have to cut down somewhere.

And, finally, and most important, can we do away with this idea of an early deployment—i.e., an early decision—on SDI? I read where we are talking about an early deployment of SDI, something like a 1991 deployment. And if we go to that, it gives us a choice of a kinetic kill vehicle.

Kinetic kill has been considered three times. In the Bambi program back in the 1960s, it was rejected as unworkable at that time. In the High Frontier program, I think that was in 1982, it was rejected at that time by, I think, DOD and State on the grounds that it would not work, it would be too expensive, could not be defended against, and it cost too much. And now it looks like we are dusting that same old tired program off again. The reason we are going with kinetic kill is that is the only thing that would be ready by the 1980s.

EARLY DEPLOYMENT OF SDI WOULD BE TERRIBLE DECISION

I would suggest, Mr. Secretary, that an early deployment of SDI would be a terrible decision, even if you think it will work. I mean, even if you think SDI as a concept is workable, because it gets you in absolutely the worst technology achievable. Almost all the scientists I have talked to, including those at Lawrence Livermore Labs, our lead lab on this, do not believe it is defendable. And they believe it would take thousands of them—this new Jastrow report just out in late December is talking about I think it is 24,000 space-based kinetic kill vehicles.

There are various other reports that have the same order of magnitude, and that is just not going to work. We do not have the lift capability. I know you are asking for another, what is it, quarter of a million dollars in your supplemental for a new lift capability. That is simply not going to work.

To me, the SDI, at least this early deployment, at least this additional roughly $2.5 billion, when you consider the supplemental, is sort of an ideological weapon system; that is, it is something we give to the right-wing ideologs who have this vague vision about an immediate deployment of SDI. And we simply cannot afford the

SDI in an early deployment mode. And even if we could, it is the wrong thing to do because it is the wrong choice of technologies.

Obviously, I am not the only one who says that. Secretary Brown and a whole host of others have said, let us not deploy early, because if we do we choose the wrong system.

So I would simply like to urge that this year we reason together, those of us who are friends of defense, who want an overall strong posture, but who recognize that we have got to look at some of the systems we have that we cannot sustain them all. We cannot sustain everything in the inventory, and we are going to have to make some choices, even if we get your high numbers.

Now, I guess my question, after that long soliloquy, is: Do you agree that we do have to make those choices, even within your higher numbers?

Secretary WEINBERGER. I see the red light on. I do not know if that is for me or for the Senator. Do I have some time to answer?

Senator JOHNSTON. No, that is not for you.

Chairman CHILES. We will let you answer his question. He took a long time in getting to it.

Secretary WEINBERGER. All right. On the way to answering his question, I would have to say, Mr. Chairman, that the only point I really agree with is the nice things the Senator said at the beginning. [Laughter.]

Senator JOHNSTON. Be careful, or I might take those back. [Laughter.]

Secretary WEINBERGER. I thought I would get in my agreement immediately.

B-1 EXTREMELY GOOD AIRPLANE

The B-1 is a very good airplane. It is our most advanced bomber, and it has the following capabilities. If we could get that chart up so that you can see it, it performs all required functions. It has a larger bomb load than the B-52. It has a radar cross-section one one-hundredth of the B-52. It is perfectly capable of carrying out its military mission.

It does have a problem with its defensive avionics (electronic countermeasures, or ECM) system, however. Developing this system turns out to have been a bigger challenge for the contractor than we expected. Compounding that challenge is the fact that during the time we have had developing and obtaining it, the Soviets have made improvements in their air defenses. And, obviously, we want to try to match that, so that there is additional ECM that we want to put into it.

But to characterize it as an Edsel or, if I might use the expression, Senator, some nonsense like that, is really inaccurate and does a great disservice to the Air Force and the people who will fly it. It is an extremely good airplane.

As with all brand new, highly advanced systems—and it is the most advanced bomber in the world—there are certainly going to be some adjustments that need to be done as it comes on line. We have 18 now on line. We are working on the 50th plane. The plane is, fortunately, funded, and it will be delivered on time and within budget. We were coming in below budget. Congress took away some of that money. We are asking simply to get it back so that we can achieve its intended ECM capability.

As to being unable to fund all the systems that we have, we can fund them if the Congress will approve the amounts indicated in the present 2-year budgets and in the rest of the 5-year plan.

MX IS NEEDED

With respect to the MX, the MX is needed. The Soviets are working on two follow-on systems beyond the generations that they already have on the ground. If we want to maintain a triad of defenses that is accurate and has the capability of destroying their hardened targets, we need the MX. We have approval for 50. We are trying to comply with congressional desires for a more mobile mode for the remaining 50. And we believe we have that in the rail garrison system.

TWO CARRIERS ARE REPLACEMENTS FOR 50-YEAR-OLD CARRIERS

I could debate at great lengths why the two carriers are needed. They are not additions, they are to be replacements for 50-year-old carriers when they deploy in the mid-1990s, and we will save about a billion to a billion and-a-half dollars ordering them both at once.

SDI NEEDS RESEARCH FUNDING

With respect to the SDI, we are only talking about early deployment if we are able to deploy a working, effective, integral part of the whole system. And kinetic kill is not in any sense necessarily what we are going to be doing. I do urge you to have the briefing that General Abrahamson is prepared to present. We would not deploy anything that was not effective, and we would not deploy anything that was not fully able to deal with the Soviet missiles on their way in. We would not deploy anything that was not an integral part of the whole system.

We do want to deploy as early as we can, if we can get that degree of effectiveness, because we do believe it is the most hopeful concept. It is the only concept that I know of that offers to protect people by destroying weapons instead of people. It is not a political or an ideological thing. It is a very practical real thing, if we can do it. But we will certainly need some research funding to decide on the best system and develop it.

HARD CHOICES HAVE BEEN MADE

With respect to your final question, sir, yes, we will have to make hard choices, and we have done it. After prioritizing we have eliminated a lot of programs that we would much rather have kept.

We do not present to you a wish list or a beginning statement. We present to you budgets that have been worked over for a year and have had major reductions made in them.

Senator JOHNSTON. Other than that, you completely agree with what I had to say?

Secretary WEINBERGER. Absolutely. Yes, sir, I do. That leaves us the first paragraph.

Chairman CHILES. Senator Rudman.

Senator RUDMAN. Thank you, Mr. Chairman.

Mr. Secretary, Admiral Crowe, I particularly want to ask a question which I was thinking about before the hearing started this morning, but which is even more interesting to me after hearing Admiral Crowe's statement. I think it is an excellent statement. It is one of the best that I have seen in 6 years here.

On defense appropriations, we talk about things that are programmatic-specific. I expect here we ought to talk more about policy. In your prepared statement, on page 3, you say—and I will just read it briefly:

> In essence, we are betting that in a major war we can expand our peacetime forces and bring out total resources (technological, industrial, personnel, economic, political) to bear so that we can ultimately prevail. This is an appropriate policy for democracy but it also leaves little room for day-to-day miscalculations.

I think any student of history would agree with that; particularly students of history of the 1938–1943 mobilization period would tell you there was not much room for miscalculation even at a time when we had an industrial base that was far different than the one we have today—an industrial base that could produce enormous quantities of the kind of materials that we do not have the capability of producing today. We do not have the same capabilities. It would take decades to rebuild it.

SUSTAINABILITY IS A CONCERN

This is my question. I get the feeling that there is always a big fight within the Defense Department—that is proper—as to what finally to bring before us. I am very concerned about sustainability. I really wonder if whether or not we ought to make some sacrifices this year on maybe a major program if we have to do it to get us in a position where, if we are faced with a conventional threat, we have the ability to confront the threat over a much longer period of time than you people are planning for over there.

I think your planning is dead wrong. I have talked to people within the Pentagon who are some of your best planners who believe it is dead wrong. I think that, faced with the mobilization problems we have—the questions of sustainability, with munitions, spare parts, petroleum, reserves—it is absolutely essential for the fleet admiral, for the Air Force, for the Army to consider our position. If we do not have that kind of sustainability, if we are faced with a conventional situation at all, I do not think we are going to have the time to do what you are properly stating in your statement.

I wonder why you cannot resolve that once and for all. Sure, the Secretary says we are improving sustainability, and I agree with him; we have. I know the limitations you face. But faced with realities, why do we not really do something this year to put sustainability and readiness in the best position it has been in in this decade. That is my question.

Admiral CROWE. Well, Senator, number one, we were on our way to having sustainability in the best position it has been in the decade; it still is, but we are still midstream and these recent cutbacks have made us stretch out sustainability, along with everything else.

If you will carefully look at the budget and how it is structured, you will see that all three services have obviously put more emphasis on sustainability than the other pillars, that they have made cuts in procurement, they have made cuts in force structure, they have made some O&M cuts and so forth, in order to protect sustainability.

That does not say that it is where we want it to be, and we cannot do it in 1 year. We cannot put it where we want to in 1 year.

MAKE STOCKPILING HIGH PRIORITY

Senator **Rudman**. Well, Admiral, I would argue that. I would say that if you wanted to make it a high enough priority in terms of conventional munitions and fire-and-forget munitions, it would be possible to improve our position. With that kind of commitment, you could stockpile sufficient munitions—both for NATO and for the forces here to be transported in case of a confrontation—to increase supplies by a factor of two and three within a 12- to 18-month period. Are you willing to divert the resources—I think this is the real issue.

Admiral **Crowe**. And it would be considerable. And, of course, the real issue is the trade-offs. I mean, you have every one of those people, and all the Services that have to say, well, am I willing to do what you just described? In other words, this year would we completely play down modernization, completely play down force structure, in order to buy sustainability?

Senator **Rudman**. That is obviously the issue.

Admiral **Crowe**. The munitions that we are the shortest on are more sophisticated modern ones, high accuracy munitions, and in many cases that is also a matter of production capability. Well, in some categories, we are buying as much as can be produced.

Senator **Rudman**. I am going to use less than my time, and I just want to leave you with this thought, as one who basically supports what you proposed this morning.

CONVENTIONAL DETERRENCE EXTREMELY CRITICAL

I happen to believe we talk a lot about deterrence. We talk about strategic deterrence, but there is something to conventional deterrence as well if you look at history. When you read your statement—which is an excellent statement, one of the best I have seen since I have been here, Admiral—it seems to me that if you are going to have conventional deterrence, you need long-range sustainability, even if it takes a sacrifice in one of these fiscal years to get there.

I hope that this committee will consider that, and I know that the Defense Appropriations Committee will consider that, because conventional deterrence—particularly if the President is successful, as I hope he is, with some kind of arms control—conventional deterrence becomes from our point of view extremely critical.

Secretary **Weinberger**. Mr. Chairman, just in furtherance of that, I do not disagree with it at all, but I do have to point out that in two fiscal years, Congress has cut out 5,000 air launched missiles that we asked for, 756 Chaparral missiles, 10,000 TOW-2 missiles, and 177 torpedoes and so on. The list goes on for a very long time.

We would like to have the kind of things Senator Rudman is talking about. We have asked for it. We have not been granted it.

Chairman CHILES. Senator Conrad.

SOVIETS SPEND ABOUT $700 BILLION YEARLY ON DEFENSE

Senator CONRAD. Mr. Secretary, could you just tell me quickly the percentage of GNP that the Soviets devote to defense and what the dollar comparison would be? Do we have that?

Secretary WEINBERGER. Well, it is about 16 to 17 percent of their gross national product. I have seen various calculations and it involves some comparatively esoteric work that some use to figure out what we would have to spend to get the kind of output they do. You have to bounce back and forth between rubles and dollars, but essentially it is about $700 billion a year.

Senator CONRAD. Do we have any estimate of what percentage of their total government spending that represents?

Secretary WEINBERGER. No, we do not, really, because they can hide things all over in a number of different pockets, in buildings and departments and so on. But we think that a very large percent of the total Soviet effort, which is all governmental, is devoted to defense. I would suspect it is close to 50 to 60 percent based on the quality of life that they have from all the other things that they do. They do not worry about that. They do not have public opinion, and they have an economy and a quality of life that neither you nor I nor any of us could tolerate for more than a very short time.

But I do not have any estimate as to the total amount that they put into military offensive strength because it is not all in the military budget. If you look at the military budget, it stays constant year after year. It never changes. I think it is 17 billion rubles. It just never changes, which is a remarkable feat.

SPENDING DIFFERENTIAL NO THREAT TO COMPETITIVENESS

Senator CONRAD. Let me ask a follow-up question, if I might. The Japanese spend about 1 percent of GNP on defense. Western Europe spends 3 percent, and we are at 6 percent. Do you see that that differential represents any threat to our competitiveness—and I am talking vis-a-vis the Japanese and the Western Europeans—and, hence, to our economic national security?

Secretary WEINBERGER. I do not really think so, Senator. I have always tried to keep trade and security questions separate, and there are all kinds of trade questions with Japan and trade barriers and things of that kind.

With respect to security, it is true that we have been urging Japan for a long time to spend more on defense, just as we have been urging ourselves to spend more on defense, and our NATO allies.

They are doing so now. Their percentage increase in their budget will be close to 7 percent at a time when all their other departments are being cut. They do a lot of things to support our troops in the form of housing and various other logistical supports. And that, added to their actual defense budget, means that they have a substantially higher contribution than just the 1 percent.

I do not quarrel with you for a moment that we think all of our NATO allies, and ourselves and Japan, should do more. I think Korea is probably the only one not in that category. They do a very great deal for themselves, and, of course, they are facing an imminent threat about 26 miles away from their capital. But——

DIFFERENTIAL IN SPENDING UNFAIR

Senator CONRAD. Let me just interrupt and say that some of us feel very strongly that in terms of competitiveness, that it's very difficult for us vis-a-vis the Japanese and the Western Europeans, as long as we are putting 6 percent of GNP into defense, and they spend only 1 or 3 percent. That has to hurt us; there is a capital expenditure in investment being made that we are making that they are not making. And it is really unfair to us for that kind of differential to continue, one reason we have got such a serious trade problem is because we make that investment—which is partly in their behalf. They do not make it; they invest the difference in consumer products and then kill us in the international marketplace.

Secretary WEINBERGER. Well, Senator, as I say, there are a lot of arguments with respect to trade. I have tried to keep them separate in our own presentations, in our own thinking from security questions.

JAPAN'S FAILURE TO SPEND ON DEFENSE IMPOSED ON THEM

Bear in mind that the Japanese failure to spend on defense was imposed upon them after certain widely known events a few years ago. We did it ourselves, and we did it for a very good reason.

We have now, I think, basically changed that thought, and we are urging them, and I think with considerable effectiveness, to do a lot more for their own defense and free ourselves for other military duties required in that area.

But they are not yet doing what any of us think is essential, any more than we are doing ourselves.

Senator CONRAD. My time is close to expiring, so I will forego other questions I might have.

Chairman CHILES. Senator Armstrong.

Senator ARMSTRONG. Thank you, Mr. Chairman.

Mr. Secretary and Admiral Crowe, I want to join my colleagues in congratulating you on your statements. An informal survey at this end of the room reveals that these are the two best statements we have had in a long time. We are grateful for them.

Secretary WEINBERGER. Thank you.

DEFENSE BUDGET NEEDS REAL INCREASES

Senator ARMSTRONG. Mr. Secretary, the defense budget has taken a shellacking the last couple of years, and not to put too fine a point on it, you have frequently been criticized for holding out for numbers that are way above what has been thought to be popular or politically realistic.

I would just like to say to you—and it may prove that what my colleague, Senator Johnston, has said will prove to be right: by coming in with a lower number it may minimize the range of negotiation, and it may work out fine.

My observation is that had you not come in with the budgets you have in the past, the cuts would have been even greater, because just observing the process, I note that you come in with your budget each year and the Budget Committee has cut it, and then it has gone to the floor and it has been cut. And then the budget goes over the House and it gets cut, and then the Defense Committees in the House and Senate write their authorization bills and it gets cut again. And then the Appropriations Committee gets around to it and they take a whack out of it. And, by gosh, I have not any idea what sort of a defense spending pattern we would have had had you not come in with some pretty strong recommendations in the past.

I will be interested to see whether or not Senator Johnston's scenario plays out. I hope it does because I am personally convinced that we have erred on the side of too little defense spending the last year or so, and I did not hesitate earlier to say it was a little more than I thought was necessary. But I do not think we can stand that again. I share your conviction that we need to have some real increases, and I would like to be helpful in that task.

Secretary **WEINBERGER**. Thank you.

CHANGE IN QUALITY OF PERSONNEL

Senator **ARMSTRONG**. I was particularly impressed, Mr. Secretary, with your observations about the quality of personnel. And I notice that the proportion of high school graduates that were entering the military service rose dramatically between 1980 and 1982, and so did the proportion in the higher mental categories. And the same pattern existed among re-enlistments, both for first-term reenlistments and career re-enlistments.

Could you identify for the committee what the policy changes were that led to that dramatic and, I think, very significant improvement?

Secretary **WEINBERGER**. Well, Senator, I think many things led to it. In the first place, I think we, the Congress, and the administration recognized that the pay had fallen to shamefully low levels in the 1970s.

Military families had to go on food stamps, and military spouses had to take second jobs. That fortunately, is over, and we corrected that the first year we came and I am delighted that we did. It was a disgrace to have allowed it to get in that condition. That is one thing.

But I think it is fair to say that a large part of the numbers that we very proudly put on the charts is due to a feeling of resurgence of national patriotism, if you like. It is no longer considered bad form to love America. It is no longer considered bad form to want to be patriotic, and that is a major shift which has come about in the last few years, I have to say, and not in any partisan sense, because of the President's leadership.

I think that he has articulated and installed and led a growth in American patriotism in the best sense of the term, and it has resulted in a very large number of excellent people who want to join the military.

The quality of new recruits is very much higher than that of the late 1970s. I think it is a national resurgence of national pride and national desire to serve, and I am delighted that it is. It is one of the best things that has happened to America in a very long time and it is by far what I am most proud of and most happy about in the defense of the nation over the last 6 years.

GI BILL HELPS ENLISTMENTS

Senator ARMSTRONG. How about the GI bill?

Secretary WEINBERGER. I think that has helped. I think all these things help, without any question. I do not think people join the military to earn money; they join for a number of reasons.

I think a lot of them may leave because they feel they are being unfairly treated. It is vital that we eliminate that feeling.

Senator ARMSTRONG. Does the administration support the extension of the GI bill?

Secretary WEINBERGER. Yes, I think we have an extension in this time that supports it.

Senator ARMSTRONG. Is there polling data or other kind of data available to tell us the actual effect on both recruiting and retention of the GI bill?

Secretary WEINBERGER. We do not have any survey results which would show the effect of the new GI bill, but there are enlistments and participation rates which give some indication of the effect on recruiting. It is still too early to provide retention data since those initially enrolling have not yet finished their first term of service.

Senator ARMSTRONG. Mr. Secretary, I do not know whether or not this has been previously submitted, but if it has not been, could you furnish us with that kind of polling data either for the record or to my office?

Secretary WEINBERGER. Yes.

[The following was subsequently supplied for the record by DOD:]

IMPACTS OF NEW GI BILL

Participation rates for the active components under the New GI Bill have been very good. Since the program was established, 76 percent of Army recruits, 61 percent of Marine Corps recruits, 44 percent of Navy and 42 percent of Air Force recruits have signed up for the program. The New GI Bill has also proven popular with the reserve component members. Of the estimated number of members eligible to participate, over 65 percent have already applied to the Veterans Administration for benefits.

Although there are no statistics yet available, reserve retention should be enhanced since eligibility for the New GI Bill benefits is contingent upon contained satisfactory participation in the Selected Reserve. For the active forces, it is too early to assess the impact the New GI Bill will have on retention, since no one who enlisted under that program has thus far completed his term of service.

As far as recruiting effects are concerned, we have completed analyses on both active and reserve accessions under this program. With respect to quantity of accessions for the active forces, the New GI Bill has had little appreciable effect over the previous educational incentive program. The Services met their accession goals under the Veterans' Educational Assistance Program and continue to do so under the New GI Bill. For the reserve components, we looked at the length of terms of service of new accessions since a reserve circuit must enlist for a six-year term in order to qualify for benefits under the New GI Bill. During the first fifteen months under the New GI Bill, 59 percent of the accessions signed up for at least six years. For the same period immediately before its introduction, 57 percent had taken six-year terms.

In terms of quality, we have examined data on active component accessions for the same fifteen month periods. Before the New GI Bill, DOD recruited 54 percent high school graduates scoring in the top half of the aptitude range on the enlistment test. Under the New GI Bill, that figure increased to 59 percent. The Army accounts for most of the change. Its rate rose from 47 percent to 58 percent, while the other Services' rate rose from 58 to 59 percent. It should be noted that the Army College Fund (additional benefit of up to $14,400) is added to the New GI Bill basic benefit for many Army recruits, greatly enhancing its attractiveness.

While educational benefits have been shown to have a role in recruiting, we would caution that the changes in recruit quality cannot be attributed to any one cause. During the time the New GI Bill has been in effect, several changes were made in active and reserve component recruiting programs (additional recruiters, and enhanced recruiting budgets) which might have also affected recruit quality.

Senator ARMSTRONG. I am very much interested in the GI bill; I think it has been a fine program. As we prepare to reauthorize it, as I hope we will, I would just like to have some documentation of what success we have had.

Secretary WEINBERGER. All right, sir, fine.

Admiral CROWE. Senator, could I add a note?

Senator ARMSTRONG. Yes, sir.

Admiral CROWE. I want to associate myself with the remarks the Secretary made. Number one, I see this throughout talking with individuals all over the world, and it is a change in attitude and it comes from families, it comes from home support, it comes from the grass roots, and I think it is extremely important.

DEPENDENTS IN EUROPE IMPORTANT TO MORALE

Also, we have got to protect it, and we should look carefully at any cutbacks in prequisites, benefits, fringe benefits. And, Senator Johnston, I was a little worried about a statement you made about dependents in Europe. This is one of the things, I think, before we act on something like that we should examine very closely because it has a great deal to do with the morale of our armed forces, the quality of the people we can attract and retain.

That is our highest priority. Those people are our biggest resource, our most important resource, and I can assure you that the fact that we can have dependents in Europe is very important to the quality of our presence there.

Senator JOHNSTON. Mr. Chairman, if I may just reply to that, I used to be one; I served in Europe and I know it is very important. But if I am right that you cannot afford everything, I think that is one of the things that needs to be looked at, along with these other things.

Admiral CROWE. I understand.

Senator JOHNSTON. If the Secretary is right and we can afford it all, well, great.

Senator ARMSTRONG. Mr. Chairman, my time is up, but may I have 10 seconds more?

Chairman CHILES. Yes, sir.

Senator ARMSTRONG. Mr. Secretary, you are going to submit, as I understand it, a relatively complete list documenting the $293 billion in programmatic changes.

Secretary **Weinberger**. Yes, sir.

Senator **Armstrong**. May I ask that as you do so that to the extent it is possible, you relate those to the strategic issues; in other words, not just how many planes we lost, but really the answer to the question, so what. So, we did not get 40 F-15s, or I guess actually 45 F-15s we had hoped to get.

What difference does this make to the defense posture of the country? At least to the extent you are able to be specific, it would really be helpful.

Secretary **Weinberger**. I would be glad to do that, sir.

Senator **Armstrong**. Thank you very much.

[The following information was subsequently supplied for the record by DOD:]

DOD PROGRAM LOSSES

The following table provides a summary of the program loss by appropriation title for each year:

REDUCTIONS TO THE FISCAL YEAR 1985 DOD PLAN BUDGET AUTHORITY

[Fiscal year 1984 dollars in billions]

	Fiscal Year—					Cumulative loss
	1985	1986	1987	1988	1989	
Military personnel	−1.7	−6.2	−3.4	−3.3	−3.7	−18.3
O&M	−3.2	−12.7	−16.8	−18.0	−20.2	−70.9
Procurement	−8.2	−26.9	−40.8	−47.6	−46.8	−170.3
RDT&E	−2.2	−3.0	−1.1	+1.3	−1.0	−6.0
Military construction/family housing	−1.7	−5.1	−5.7	−5.0	−6.1	−23.6
All other	.9	−1.0	−1.0	−1.0	−1.0	−4.9
Total DOD	−17.9	−54.0	−68.8	−73.6	−78.8	−294.0

The adjustments are to the FY 1985 plan that was included in the President's budget request submitted to the Congress in January 1984. The adjustments include explicit reductions made in DOD appropriations for FY 1985 through FY 1987. These reductions also include adjustments made by the Administration in order to meet the levels established for National Defense in the Budget Resolution. More than half of the adjustments were in the procurement accounts where the modernization efforts have been delayed. The aircraft losses amounted to 438 tactical aircraft. Other procurement losses include 985 Bradley Fighting Vehicles, and substantial cuts in Patriot missiles and TOW-II missiles.

In Research and Development, the technology base program to provide long-term weapon qualitative superiority has been held at no growth. Options have been reduced for the SDI program and R&D for both strategic and tactical programs have been reduced.

Essential military construction and Family House projects have been delayed involving construction for mission and weapon support and quality-of-life improvements in family housing.

Military personnel programs and readiness have been protected to the extent possible but there have been reductions in both active and reserve strengths and reductions in training and maintenance.

The impact of these program losses not only increase the risks but also add to the cost of weapon systems through inefficient acquisition.

Chairman **Chiles**. Senator Sasser.

Senator **Sasser**. Thank you, Mr. Chairman.

DEFENSE OUTLAYS

Mr. Secretary, I want to welcome you and Admiral Crowe here this morning and call your attention, Mr. Secretary, to one of the charts that was used in your testimony. It is captioned "Defense Outlays as a Share of Total Federal Outlays." [See chart 9, p. 18.]

I note that in fiscal year 1969, we start seeing a rather precipitous drop in defense outlays as a percentage of Federal outlays, and that coincides with the year in which Social Security became part of the unified budget.

Was that factored into your chart there that Social Security first became part of the unified budget in 1969?

Secretary WEINBERGER. I believe it is, Senator. The addition of the Social Security to the total budget did take place about that time. Social Security was, of course, an expenditure of the Federal Government for a long time before that, and I believe this reflects that.

Senator SASSER. You have no doubt that that is reflected in your charts?

Secretary WEINBERGER. I think it is. We will certainly be glad to verify that.

Senator SASSER. Well, I would like very much to have that verified, Mr. Secretary, and I say this to you respectfully and frankly with some affection, but many of us have some doubt as to the accuracy of the charts and numbers that we consistently get from the Department of Defense.

I have been in the Senate now for 10 years and I find I no longer bother to go to briefings held, for example, by DIA because I decided some time ago I would rather be uninformed on some of these issues than misinformed, to be quite frank about it.

And I think there is a credibility problem on the part of the Department of Defense here on the Hill, and I think that is very, very unfortunate because we all certainly want to be dealing with the same numbers when we are trying to arrive at some very, very important decisions.

Secretary WEINBERGER. We certainly should. In my 6 years with the Department, I have found no reason to believe any of the charts or any of the information furnished by DIA or charts submitted by our budget people to be in any way misleading, and I would be extremely distressed if I ever found that were the case.

Senator SASSER. Well, I would like to know as a matter of fact whether or not that particular chart shows the unified budget including Social Security, because I find it striking that you get that precipitous decline in defense expenditures in 1969 when we are fighting a war in Vietnam.

Secretary WEINBERGER. The final phase of the Vietnam war took place during that steep decline area, but we will get the data for you with respect to Social Security.

[The following information was subsequently supplied for the record by DOD:]

FEDERAL OUTLAYS AND SOCIAL SECURITY

Federal outlays shown on the chart are consistent in all years and include outlays for social security even though social security was treated as off-budget in some of those years. There is no distortion or break in the continuity of the federal outlays series as it pertains to social security.

MESSAGE SENT TO NATO ALLIES

Senator SASSER. Admiral Crowe, if I could, sir, I would like to call your attention to a statement you made a moment ago in your prepared statement. You indicated that you were worried about the message that would be sent to our allies if we should have zero growth in our defense spending this year and in the outyears.

Now, we have had a 42-percent real growth in defense spending since 1981, and my sense of it is that this 42-percent real growth in defense expenditures has sent a message to our allies, particularly our NATO allies, that they do not need to increase their defense expenditures; that they can simply rely on Uncle Sam to take care of the lion's share of the defense load.

As we have been increasing our defense expenditures by 42 percent in real growth, what expenditure increase have we seen on the part of our NATO allies and what message have we been sending them, in your judgment, with this greatly increased defense expenditure?

Admiral CROWE. Well, Senator, first of all, I do not think there is any question that NATO allies received the message in a mixed fashion. We have good success in persuading some allies of the need to do more, to spend more; with others, we have not.

There is no question that those years, in the last 4 or 5 years that we increased our expenditures, that this was, at least in my view and the people I have talked to and deal with—that this was helpful in encouraging our allies to do more.

It was not uniformly across the board that way, but in general. Allies are a lot like friends; their gratitude is the expectation of favors yet to come. We are encouraging people to do more every day in NATO. I go to quarterly meetings, or roughly quarterly meetings, with Secretary Weinberger where he pushes very hard for increased capability in NATO, increased expenditures among all of our allies.

It is a very strong argument when they turn to you and say you have asked for three percent from all the allies—and that is the policy which we have tried very hard to sell—and this year you are not doing it and you are complaining to us because we have not made 3-percent increases, et cetera. When we do not do it, it is bound to weaken our argument, and I think it does.

WESTERN WORLD SHOULD PICK UP FAIR SHARE

Senator SASSER. You know, Admiral Crowe, we made an agreement in 1978 during the Carter administration with our NATO allies that we would all increase defense spending 3 percent per year in real terms.

Now, I do not know of any one of our NATO allies that has lived up to that agreement every one of those years. I do remember vividly when the West Germans indicated to us that they could not live up to it one year because of poor economic conditions, and the Chancellor of West Germany asserted high interest rates in the

United States as the reason that they could not live up to their 3 percent that year.

And we have seen in the ensuing years real increases in our defense outlays far exceeding the 3 percent of our NATO allies, and here we find ourselves almost a half a century after the Second World War with over 300,000 troops in Western Europe, allocating something in the neighborhood, if memory serves me correctly, of almost $100 billion to the defense of Western Europe.

Now, one Senator's view is that it is high time that we sent a message to our allies, and they are valued allies—I do not mean to demean them with this statement, but that we send to them a message in no uncertain terms that they have got to pick up their fair share of the defense of the Western world, or else we are not going to continue to make what I consider disproportionate expenditures in their defense.

I see my time is up. I would like to pursue this line of questioning with you, sir, and perhaps later when you and the Secretary appear before the Defense Appropriations Subcommittee, I may do that.

Thank you.

Chairman CHILES. Senator Nickles.

NEGATIVE REAL GROWTH QUESTIONED

Senator NICKLES. Thank you, Mr. Chairman. I, like my colleagues, welcome the Secretary and the Chairman before the committee. But I will also express my concern about hearing statements that we had negative real growth.

I happen to be a very strong supporter of defense and I have supported most of the programs that Senator Johnston has criticized, and others. But I would agree with his assessment that we have not had negative real growth in spending for the last several years.

In our discussion with our allies we are trying to get them to do a 3-percent real growth. In looking at the last several years in outlay percentage increases, they will exceed 3 percent.

Your chart showed, I think Mr. Secretary, very large increases in the first years of the administration which were supported by the Congress, and even some in the last couple years—and it seems that is where some of the discrepancies are figuring.

Looking at 1985 and 1986, I see eight percent; 1986-1987 is the only year, and that is 3 percent and I do not read that as a negative. What inflation figures are you using?

Secretary WEINBERGER. We are using budget authority, Senator, which is the measure that we have always used. The following figures speak for themselves: $281 billion of budget authority 1 year and down the next year; when you have $273 billion for the President's request in 1984 and $258 billion enacted; and then $285 billion enacted in 1985 down to $278 billion in 1986. Those are very real declines.

The rate of inflation is low. We have to talk about the real terms. The rate of inflation does not add anything to defensive strength.

BUDGET AUTHORITY IS THE REAL MEASURE

Senator NICKLES. Mr. Secretary, again, I think looking at that chart you are using, is that actual dollar figures that were on budget authority? My figures were on outlays.

Secretary WEINBERGER. Outlays are a product of prior years' authority. The authority is given in 1 year. Sometimes it is all spent in 1 year; sometimes it is spread over 4 or 5 years.

Outlays are not the measure. The outlays are the result of prior authority. When the authority goes down, as it did in 1986 and 1987, the ability of the Department either to plan or to acquire in the future years is restricted and restrained.

The outlay of any 1 year is the product of authority built back many years before. The only real measure that we think effectively states the ability of the Department to regain and maintain defensive strength over the years is budget authority. That is the figure we have always used.

Senator NICKLES. Mr. Secretary, in looking at budget authority for 1988 and 1989—and I hear you saying the real growth is 3 percent and 3 percent.

Secretary WEINBERGER. That is right.

INFLATION MUST BE FIGURED IN REAL GROWTH

Senator NICKLES. And I have expressed to you in the past my frustration at DOD or any other department coming up and saying, well, real growth—I calculate those percentages around 7 percent in actual dollar outlay increases.

Secretary WEINBERGER. In nominal terms, that is right for budget authority, but since whatever portion of that growth is inflation and inflation is simply a higher price to get the same thing, it has to be figured in real terms to see the effect on defense strength.

Using nominal terms, the effective inflation cannot be washed out. Therefore, there is 7 percent nominal growth, 3-percent real growth in budget authority.

Senator NICKLES. I am not sure that I totally concur with that. You are using inflation figures that are double, I think, that of the CPI for the rest of the country.

Secretary WEINBERGER. No, sir, we are not. We are using the OMB figures which are given to us and which we are required to use. They are 3 percent, 3.5 percent, and 3.3 percent.

Senator NICKLES. Are those the inflation figures that you use for 1988 and 1989?

Secretary WEINBERGER. Yes, sir.

Senator NICKLES. The inflation for last year was, what, less than 2 percent?

Secretary WEINBERGER. I think so; I'm not sure. Whatever it was, we——

Senator NICKLES. I just make that comment. It has always frustrated me, and I think to some extent when you have those built-in inflation figures—and this criticism is not just directed solely at DOD—if you are making a purchase—I happened to be in manufacturing prior to my Senate career—if they know you have plugged-in inflation figures, you are asking for those kinds of built-in costs.

Secretary **Weinberger**. You try to estimate it as best you can. When I came up here on my first presentation in 1981, we were heavily challenged on the ground that our inflation estimates were low and totally unrealistic.

As it turned out, actual figures were lower than the estimates. They have been for many years.

PROCUREMENT COSTS DOWN

Senator **Nickles**. My time has almost expired. Did you not mention in part of your statement that your procurement costs for additional items were running at a figure of less than one percent?

Secretary **Weinberger**. That is the cost growth of the major weapons systems, yes.

Senator **Nickles**. Well, I think that is good. I do not think that we should be building in higher inflation figures, asking for higher figures in the outyears.

Secretary **Weinberger**. That 1 percent is, again, 1 percent in real terms.

Senator **Nickles**. So you are having a real cost increase for those procurement items?

Secretary **Weinberger**. That real cost growth was 14 or 15 percent per year and now it is minus one. The effect of inflation has to be washed out of every figure because inflation simply means paying more for what you got last year.

Senator **Nickles**. Well, a lot of us in manufacturing outside of DOD do not sell things with automatic inflation adjustments over the life of the contract.

Secretary **Weinberger**. When we request money from the Congress, it is requested on the basis of the OMB estimates of what inflation would be. Sometimes those are high and sometimes they are low.

When they are low, as they were during the 1970s—inflation was estimated, I think, at 7 percent in most of those years. It came in at 14 and 15 percent, and the Department suffered badly during that time.

When the inflation estimate is higher than the actual, that money is reported to the Congress. Sometimes it is returned to the Treasury; sometimes it is applied, with Congressional approval, to reprogramming. It is never hidden.

Senator **Nickles**. Thank you, Mr. Secretary.

Chairman **Chiles**. Senator Exon.

Senator **Exon**. Mr. Chairman, thank you very much.

Secretary Weinberger and Admiral Crowe, we are pleased to have you here this morning.

CAN CHANGEOVER IN INDUSTRIAL MIGHT BE MADE IN TIME

Mr. Secretary, one key historic factor in our Nation's security, I think we would all agree, has been our ability to turn our industrial might, when necessary, toward the war effort.

Are you concerned about the U.S. industrial trends and the possible loss and the actual loss of much heavy industry and, evidently in the near future, much of our high tech industry in the United States to foreigners? Are you concerned about this foreign ownership of some of our domestic industrial wealth by foreign sources that could adversely affect our defense effort in future years?

Secretary **Weinberger**. We are obviously concerned about all of those things. We have to be because it is essential that we maintain a mobilization potential.

What I am most concerned about is whether we have the time to make the needed changeover that we need; as we had in the last two major wars. I don't know whether we shall have that time again in future situations, and that is why we have to concentrate so much on increasing our war reserve stocks and furthering our production surge enhancement initiatives. We will need to go in with a higher base than we did before. We barely had enough time in World War II.

I am not so concerned about the foreign ownership because in the event of any mobilization we could exercise the government's authority to take over and run those plants if a problem arose.

It is essential to have the capability to move to a wartime mobilization production basis as quickly as possible, far more quickly than we have had to do in the past.

Senator **Exon**. Well, I am talking specifically, you know, about not only foreign ownership but possibly transfer of those facilities to other places. If they are here in the United States, that's one thing.

I am specifically asking, are you prepared to give me any further information on whether or not the administration is going to allow the Japanese to acquire the Fairchild facilities with regard——

Secretary **Weinberger**. It is under very careful review by the Security Council, and we are obviously being consulted on it, and others. I can't give you any definitive answer today, no, sir.

CONVENTIONAL DEFENSE MORE COSTLY THAN NUCLEAR DEFENSE

Senator **Exon**. Turning to another subject, as you know, I have been very much concerned about the fiscal realities of the outyear defense budget, which I think is tremendously important. I think maybe sometimes we don't level with the American people the way we should. I am not saying that in a critical factor to you—all of us. With regard to what it is going to cost to defend this Nation in the future, I think, is going to be considerable.

I simply say that maybe we should clarify for the American public that if we are successful in coming to some kind of an agreement with the Soviet Union for a significant reduction of some of the forces, along the lines of that suggested at Reikjavik, I think there are a lot of people that assume that if we would come to that kind of agreement with the Soviets, we would have an immediate and dramatic reduction in the total expenditures for national defense. I suspect that that would not be the result of such a happy arrangement between the Soviet Union and the United States. Is that correct?

Secretary **Weinberger**. That is absolutely correct, Senator. There is no question that conventional defense is a great deal more expensive than nuclear defense. And while most people feel it would be a better world if nuclear weapons were eliminated worldwide, the simple fact is it is going to cost a substantial amount of money to replace nuclear defense with conventional defense.

The Joint Chiefs have done studies on this, and that's the inevitable conclusion.

Senator EXON. Let's follow that up with a question. I guess your answer was based basically on what was alleged to have been proposed at the last minute even by the President. Whether that's true or not, I don't know.

REDUCTION WOULD NOT NECESSARILY BRING SAVINGS

Let's talk about a 50-percent reduction in present ICBM forces. Assume that would come to pass within the next 6 months. Would that—I assume that would affect our future procurement of MX missiles and future procurement of the Midgetman if we do indeed go into that. If we would have a 50 percent reduction, although we would be able to continue some modernization, would not we see some relief in the budget if we had a 50-percent reduction on each side?

Secretary WEINBERGER. In those accounts, yes, sir. But you have to bear in mind, Senator, that the strategic forces of the United States—all our nuclear forces are about 13 percent of the total defense budget so you would get some reductions there. You would have to have more than corresponding increases on the other side.

Admiral CROWE. Well, I understand what you are saying, Senator, and I basically agree with it. The 50-percent reduction could result in some savings. On the other hand, depending on the parameters of the agreement, you would want to modernize some of the weapon systems that you were allowed to keep.

Senator EXON. Well, let me be specific, and my time is up, but just to close, let me ask you this question.

If we had a 50-percent reduction in forces with an agreement that we considered verifiable and was agreed to by the administration, and the treaty was confirmed by the United States Senate, in that eventuality, would we likely proceed then with expenditures of $50 billion over the next several years on such a new weapon system as the Midgetman?

Secretary WEINBERGER. No; I would think not, Senator. There are a lot of ifs before you finish the question. The verifiability, the agreement by the Soviets and a measuring of what constitutes the 50 percent must all be considered. I would think that we could get them factored out.

Again, strategic forces are about 13 percent of our total budget. But in that 13 percent, yes, sir.

Senator EXON. But I think they will be going up if we continue our—it would be a higher percentage in the outyears than currently.

Secretary WEINBERGER. Not clearly, no, sir. I don't think it would go above 14 or 14½ percent.

Senator EXON. Thank you, Mr. Secretary.

Admiral CROWE. Senator, could I just say one other thing?

I just believe as a general proposition it is dangerous to look at arms reductions as a money saving exercise.

Senator EXON. Well, I don't imply that I said that.

Admiral **Crowe**. I understand.

Senator **Exon**. I think, though, that it is not generally understood out there among the public, and I think that should be emphasized over and over again.

Admiral **Crowe**. And I agree with that.

Senator **Exon**. Nor do I believe that a shield that we talk about so often, and the President has made so many television appearances on, would necessarily significantly reduce our national defense expenditures either.

Thank you, Mr. Chairman.

Chairman **Chiles**. Senator Danforth.

THE UNITED STATES FACES INCREASING THREAT

Senator **Danforth**. Mr. Secretary, in your oral presentation you said that in devising or preparing a budget for national defense the prime matter that's taken into consideration is the threat that the United States faces and, in your view, that the threat is increasing.

Could you explain why you said that and what you meant by that statement?

Secretary **Weinberger**. Yes; Senator, very easily.

The Soviet military capability has been increasing. It is an offensive military capability. They are going to large, fixed wing carriers. They are increasing their number of strategic and conventional missiles. They have enormous numerical advantages on the conventional side, and they are increasing it. They have shown no diminution whatever of their ability to, or their desire to acquire bases to use in various overseas areas to help project their power.

Everything that they are doing, all that we are seeing, intelligence reports and everything else, indicates very clearly to us that they continue to try to secure their basic overall strategic goal which is and always has been world domination. We don't see anything that indicates the slightest change in any of their actions that count.

Senator **Danforth**. The threat that you perceive is the threat from the Soviet Union, is that correct?

Secretary **Weinberger**. Yes, sir.

Senator **Danforth**. Or does it also include the threat of other problems such as, for example——

Secretary **Weinberger**. Oh, indeed, it does, yes, sir.

Senator **Danforth**. Central America?

Secretary **Weinberger**. It does indeed. I directed my answer to the Soviets because you asked about that primarily. But in Central America we face the possibility of the establishment of another Cuba in Nicaragua.

Last year was the highest year for military shipments from the Soviet Union and the Warsaw Pact. We also have to look at low-intensity conflicts of terrorists. All these things are basically threats to our desire to fulfill this rather modest agenda we have for our own goals.

SOVIET UNION HAS INCREASED MILITARY STEADILY

Senator **Danforth**. Now, I read somewhere recently that the build-up of the Soviet Union is contested by some. Some feel that apparently there has not been a significant buildup. Your view is that there has been a change in the Soviet Union and that they have increased military——

Secretary **Weinberger**. It has occurred steadily. It has been a steady increase since about roughly the 1960–1961 period. Occasionally a little leveling off can be seen, but it levels off at a very high plateau and then resumes going up. So I don't see any diminution or any shifting.

Admiral **Crowe**. Senator, can I say a word about that?

Senator **Danforth**. Sure.

Admiral **Crowe**. We, of course, see it over time in numbers and range of sophisticated equipment, et cetera. But I think where it is more dramatically displayed, if you—and this is what we do in our planning circles—make a list, say, in a 10-year period of the more significant deficiencies that we see in the Soviet military. Say you made a list in 1960, 1970, 1980, you can see a very deliberate, conscious and extensive effort to correct those deficiencies, move on to the next type of deficiency. In a 10-year period, the progress, both quantity- and quality-wise, has been dramatic from a military perspective.

Senator **Danforth**. Are these offensive capabilities that they are improving, or are they defensive capabilities they are improving?

Secretary **Weinberger**. My impression is they are offensive across the board.

NO SPECIAL FUNDS BUILT INTO THE BUDGET FOR CENTRAL AMERICA

Senator **Danforth**. With respect to Central America, Mr. Secretary, do you build into your budget the concern that you have expressed with respect to Central America? What is that concern and how do you build it in, and how do you see this changing in the future?

Secretary **Weinberger**. Not in our budget, as such. It's in the government budget. There is $105 million requested in the funds appropriated by the President for assistance to the people fighting for their freedom.

Senator **Danforth**. I understand. I am talking about our own military.

Secretary **Weinberger**. In our own military budget, there is an amount for military assistance groups. The military assistance, includes foreign military sales, and the military training that we do. These are not large amounts.

Senator **Danforth**. Mr. Secretary, one thing that is widely——

Secretary **Weinberger**. The chairman reminds me, too, that there are also major increases in the special operations forces that deal with terrorists and other low-intensity bomb threat areas.

GREAT DEAL OF PROGRESS MADE IN WASTE

Senator **Danforth**. One thing that is widely viewed by our public and is of concern of the American people is that there is a lot of waste in the defense budget. We have all heard the famous stories about wrenches and toilet seat covers and what not.

What progress, if any, has been made in the last year in dealing with this concern?

Secretary **WEINBERGER**. A very great deal of progress, and not just in the last year. Of course, you do know, Senator, that we are the ones who found most of those spare procurement problems and corrected them. And in the course of reporting on them, and of correcting them, we had a very substantial amount of demagogic attacks on us.

Furthermore, since fiscal year 1982, we have identified through our Inspector General, savings and cost avoidances of about $5 billion from internal audits of our own activities. The Service audit agencies have identified an additional $10.3 billion in savings over the same period. Additionally our Inspector General has reported over $100 million in recoveries, fines and restitutions since October 1981. The Service investigative organizations reported an additional $185 million over the same period. These are real funds not just paper findings.

Senator **DANFORTH**. Thank you, Mr. Chairman.

Chairman **CHILES**. Thank you.

Senator Lautenberg.

Senator **LAUTENBERG**. Mr. Secretary, welcome. I will try not to be repetitive, and I don't mind an admonition, if one comes, that says we've discussed it, we'll examine the record.

Admiral Crowe, nice to see you, of course.

Several questions arise as we review this, and I can't help, Mr. Secretary, recalling the fact that both you and I come from the business community and come here with that experience. And I have a couple of questions about procurement, as you might expect.

PERCENTAGE OF GNP COMPARISONS NOT PROPER MEASURE OF DEFENSE NEEDS

One of the things, however, on a philosophical basis, that I just wanted to square away is when we make comparisons to percentage of GNP, the validity of that kind of an evaluation worries me. Because if GNP falls markedly for some reason or other, or gains, what has that to do, frankly, with our preparedness? What has that got to do with the need to step up to the possibility of aggression outside our country?

Secretary **WEINBERGER**. It is not intended to reach that point, Senator. It is intended to answer the argument that we can't afford the kind of defense we need to keep our freedom. Essentially what we're trying to show is that we are taking a very much smaller fraction of the Nation's total product now than we were many years ago. It does not give you a necessarily proper measure of what is required for our defense because, as you point out, it does not measure the threat or anything else.

It is designed to deal with the people who say we simply cannot easily afford that kind of defense and cannot afford whatever we need to keep our freedom.

Our requests are still a very modest portion of the total national product of the Nation.

Senator **LAUTENBERG**. Mr. Secretary, there are differences of view here, and I am sure that you would agree that there is not any one of us, even those who are most critical of defense budgets, who does not want a strong America. Who does not want an America that is able to defend itself against any adversary. Who does not want to be able to protect the freedoms that we hold so dearly here.

The question is perspective on how we achieve that. Frankly, I would have to say to you that I think that as we plan the more exotic systems, the improved technological advantage, I am not sure that we gain the kind of strength that this country needs long term. I think we do ourselves a disservice in terms of the strength of our country when we shortcut the ability to educate those who have the talent and the willingness to take on leadership roles, whether they be in the military or the civilian sector. And some of our evaluation is designed more to take care of what to me looks like a short-term concern at the expense of perhaps the long-term strengthening of our Nation.

DEFENSE SPENDING MUST BE MATCHED TO THREAT

I am not one who can understand easily why it is, as we build the defense, the military capacity here, that we do not get more value from our investments. Mr. Secretary, I think we have shared some discussions about capital investments or capital budgets versus operating budgets, and so forth. And as I see that line increasing, the expenditures over the past several years growing, it seems to me that we must have some lasting value out of that investment in ships and submarines and things of that nature that reduce the need to continue building new systems. At some point I assume these things don't obsolete themselves in a short-term cycle so that they are not of the same value they were when they were put on the books. And frankly, I find it difficult to just understand why it is we have to continue to press forward. Are we saying in the same breath, well, the stuff we did a year, 2, 3, 5 years ago just isn't of value any longer?

Secretary WEINBERGER. Well, no. I think we do have to move forward, Senator, because we have to respond. When we have a defensive basic strategy, without aggressive programs or aggressive agenda in mind, we have to match our defense spending to the nature of the threat. As we said just a moment ago, it is growing, without doubt, at a very large and continuous rate.

Some of the systems do become obsolete the carriers at about 30–40 years, and others at different years. And we have to plan about 6, 7, 8 years ahead of time to replace the item as they become obsolete. The total required effort is very much greater than any of us would like it to be.

Considering the alternative, it is a very small price to pay, but it does have to be paid. We recognize that it is not popular. Domestic programs are much more popular. But what we ask for is not a massive increase in force strength, or anything of the kind. It is to modernize, sustain, and improve what we have. There is very little force increase.

Once we reach the 600-ship Navy, we will have a practically level force structure. We have to equip them and keep them modernized, and we also have to have a mobilization base to pull in the full strength of the Nation in case of war. All we are doing is trying to prevent war.

OTHER NATIONS ARE SHARING MORE OF BURDEN

Senator LAUTENBERG. Mr. Secretary, obviously the larger share that we carry of the free world defense, the less others have to carry. Or, if we turn that around, the less they carry. The more we have to carry, the more we have to say to the American taxpayers, listen, you step up and you pay the bills because we have to defend the free world.

But how about our allies? How much pressure ought we to be putting on the nation of Japan and others to share the burden?

Secretary WEINBERGER. We should put enough pressure to be effective, and I think we are doing that. The recent budgets in Japan indicate so. Many of our NATO allies spent more than we did proportionately during the 1970s when our spending dropped 20 percent.

In the final analysis, Senator, we have to ask why we do it at all—not from altruism; not just to help allies; but to help ourselves. This is the best means to maintain our freedom.

Senator LAUTENBERG. We could debate the question, because what I see is that in a country like Japan, it gives them the opportunity to divest more into their business sector, more into their training sector, and we pay the price. And, frankly, I would like you to, if you would, respond in writing perhaps to what you think a fair distribution of the load might be between our allies and ourselves in terms of common defense expenditures. Just kind of speculate for me, if you will.

Secretary WEINBERGER. I will be glad to do that. The basic quick answer is we all need to do more.

[The following was subsequently supplied for the record by DOD:]

COMMON DEFENSE EXPENDITURES

In collaborating with our allies to devise effective collective security, we have continued to emphasize the need for equitable burdensharing. Considering the diverse circumstances of our alliance and security partners, it would be neither feasible nor wise to fix a rigid standard for apportioning common defense expenditures. Nonetheless, we consistently endeavor to convince our partners to shoulder their fair share of defense obligations, whether these are measured in dollars, manpower, infrastructure, weapons or missions. Naturally, in recognition of the magnitude of the mutual threats we face, we encourage our allies to keep pace with U.S. contributions. Their ability and their dedication to do so varies.

Still, we should avoid undervaluing allied defense participation. For example, as my 1986 Report on Allied Contributions to the Common Defense details, our NATO allies are generally bearing a fair share of the common defense burden, especially in terms of: manpower (3.5 million personnel on active duty); infrastructure; and ground combat strength and tactical air power, which constitute about 60% of NATO wartime forces in these critically important categories.

Japan and South Korea, with their thriving economies, are illustrative of allies who are gradually assuming greater defense responsibilities. This year, Japan has fully funded the second year of the 1986-90 program to extend its defense of sea lines of communications to 1,000 nautical miles. Japan's defense expenditures this year were approved at levels above one percent of GDP for the first time in twenty years. Also, Japan has three times as many destroyers as the U.S. Seventh Fleet and operates a large number of ASW aircraft. In 1987, Japan will spend approximately $1.5 billion on U.S. Forces in Japan, the most generous Host Nation Support Program the U.S. enjoys anywhere. In fiscal year 1988, South Korea, a traditional recipient of substantial U.S. Foreign Military Sales credit financing, will sustain and modernize its armed forces without our security assistance funding. Since 1979, South Korea has also contributed substantial sums for building facilities under the Combined Defense Improvement Program, which is similar, in many aspects, to the Host Nation Support Program.

IMPROVEMENTS IN ACQUISITIONS SAVE $3.8 BILLION

Senator LAUTENBERG. I want to ask one question about the spare parts audit that was recently released.

The Inspector General calculated that DOD overpaid $633,000 out of a total sample of $4.5 million. That is a very substantial part. If we assume this rate of overpayment for noncompetitively procured spare parts in 1985, that number was almost $1 billion, $880 million.

If one extended that calculation, we could be losing $124 million a year currently.

On the basis of that report, Mr. Secretary, do you believe that the noncompetitive spare parts procurement continues to be an area of excessive cost or waste in the defense budget?

Secretary WEINBERGER. No; I think we have made major progress, Senator. About 80 percent of all of our contracts are awarded competitively. Our acquisition improvement in spare parts, due to our own initiatives to correct the problems we inherited have resulted in savings of $3.8 billion during fiscal years 1984 through 1986. Obviously we will continue to work on it.

I will never be able to state that everything is perfect, but it is vastly better than in 1981, and it is improving each year.

Senator LAUTENBERG. It is better than it used to be when it was real bad. Neither you nor I in our business responsibilities would have been happy with that.

Secretary WEINBERGER. No; I found contracts that, had I been on the other side representing suppliers, I would have been absolutely delighted with. But they were not good contracts for the government. They were contracts that required us to pay the prices that suppliers, usually sole-source suppliers, decided to charge. With almost 80 percent of our contracts now being competitively awarded, and with the recorded savings since improvement of spare parts acquisition, that has changed greatly.

Chairman CHILES. Senator Grassley.

CONSTRUCTION PROJECTS IN THE BUDGET ARE NEEDED

Senator LAUTENBERG. Could I get one quick question in here, please? Recognizing the value of the reserve and the need to be able to train them, there is a proposal for Fort Dix, New Jersey, to build an armory there. And I just wanted, Mr. Secretary, your confirmation that since it is proposed in the budget, you think that this is something of value that we ought to go ahead with and make sure that our country is secure?

Secretary WEINBERGER. Military construction projects, Senator, reach the budget after going through a number of years. wait and then working their way to the top of various priority lists. So military construction projects that are in the budget are needed without any question.

Senator LAUTENBERG. Thank you very much.

Chairman CHILES. That is what you call putting principle above having to——

Senator LAUTENBERG. Above interest, yes.

Senator QUAYLE. Your deal before that got a 3-percent defense budget, right?

Secretary **WEINBERGER**. Yes, right.

Chairman **CHILES**. Senator Grassley.

CERTIFICATION FIGURE NOT BREACHED

Senator **GRASSLEY**. Secretary Weinberger, I want to visit about the B-1 bomber just a little bit.

In 1983, I raised doubts about your certification of the $20.5 billion, whether or not that would produce 100 B-1 bombers. That year I got an amendment adopted which required recertification of that cost. And, of course, now we're beginning to hear figures like it may cost $7 to $10 billion additional dollars just to get the B-1 bomber flying. And I know that you made a short comment to Senator Johnston that probably you disagree with that. But I noticed in yesterday's Washington Post by Larry Welch, a General and Chief of Staff of the U.S. Air Force, a letter that basically states the contrary view from other articles in the newspaper, whether or not it is going to go beyond cost.

So my question to you, first of all is, is there any message in the fact that the Air Force people wrote the letter instead of you, whether or not maybe there would be some indication you would be backing away from that, and whether or not in the final analysis your recertification figure is going to be breached or has been breached?

Secretary **WEINBERGER**. No; the certification figure has not been breached. I stand completely behind the letter. We all worked on it and everything in the letter, in my opinion, is correct. Most of the rumors and stories about the B-1 are basically not correct.

Senator **GRASSLEY**. OK. Well, then, for my part—and I appreciate your answer; I hope that it ends up being right, although there was a second part of my amendment, the amendment I have already referred to, in which we asked the General Accounting Office to verify your recertification, and I asked them not to do it until much of the production was complete. So the final word is still not in as we would await GAO's judgment on your recertification figure.

I will go on to my final question, and it deals with another amendment that I got adopted just last year, and this goes back to a 2-year war that some of us had with your department and industry. It finally resulted in a cost and place management amendment. I think the term came--the amendment's name came out. I called it a should-cost amendment, and it was part of this year's appropriation bill.

That is the amendment, to recall to your memory, requiring access to information on labor standards and cost data. And, of course, that amendment grew out of a denial by your office to provide this committee with cost and efficiency data that we required 2 years ago right now in 1985.

The amendment requested data because we felt that it would tell us when programs are costing too much. It would tell us when the budget, the entire budget of the Defense Department was being asked at too high of a level and, more importantly, it would provide Congress with a better handle on budget data, since more and more of the defense budget is going into the black category.

So we look upon that as a very important oversight law for the defense budget.

ALL LAWS PASSED BY CONGRESS WILL BE IMPLEMENTED

Now, I would simply ask this as my bottom line question. Now that we have all agreed to the wording of that law, and that was worked out with people in the Defense Department, would you assure this committee that you will cooperate fully with any request that we may have for such data, and whether or not you plan to implement this law the way Congress passed it?

Secretary **WEINBERGER**. We implement all laws that Congress passes. We will supply any data that is appropriate, and, I am advised by my General Counsel, is legal to supply. We also have examined, however, the should-cost data, and I wouldn't want to accept any of the statements you made in your introductory remarks, Senator. We have examined the idea of the should-cost data. We know that it is very expensive to do should-cost analyses, but we believe that in most cases, it is effective. It does give us a very good norm and measurement. So we will use it whenever it is appropriate. Again, will carry out any law passed by Congress.

Senator **GRASSLEY**. And then from that standpoint then to submit that data to Congress pursuant to the law?

Secretary **WEINBERGER**. If it is legally possible and I am so advised, certainly.

Chairman **CHILES**. Thank you, sir.

EXAMPLES OF 1985 DOLLAR REDUCTIONS WITH NO CHANGE IN QUANTITIES

Mr. Secretary, I asked my staff to try to calculate the impact of some of the 1985 reductions in defense. We have gone back and forth in this pricing situation. They put together this chart up here. It covers some 21 major systems from the Army, the Navy and the Air Force. It is a sample, but I think it is a representative sample.

EXAMPLES OF 1985 DOLLAR REDUCTIONS WITH NO CHANGE IN QUANTITIES

(In Millions of Dollars)

ITEM	DOLLAR REDUCTION	PERCENT REDUCTION
ARMY AIRCRAFT		
EH-60A (Helicopter)	75.5	43.6
ARMY MISSILES		
MLRS (Multiple Launch Rocket System)	32.4	8.0
ARMY WEAPONS AND VEHICLES		
M88A1 (Tracked Combat Support Vehicle)	11.1	7.0
NAVY AIRCRAFT		
A-6E/F (Attack) Intruder	10.1	4.7
EA-6B (Electronic Warfare) Prowler	4.2	1.2
AV-8B (V/STOL) Harrier	195.7	26.4
F-14A/D (Fighter) Tomcat	13.1	1.7
F/A-18 (Fighter) Hornet	231.8	9.9
CH/MH-53E (Helicopter) Super Stallion	38.1	17.1
P-3 (Patrol) Orion	58.7	15.5
E-2C (Early Warning) Hawkeye	18.3	5.9
NAVY MISSILES		
BGM-109 Tomahawk	6.8	1.3
Laser Maverick (Air-to-ground missile)	7.6	6.9
NAVY SHIPBUILDING AND CONVERSION		
Trident (Ballistic missile submarine)	251.4	16.9
SSN-688 (Attach submarine)	160.0	7.1
CG-47 Aegis (Cruiser)	474.7	15.2
TAO Fleet Oiler	99.6	17.7
AIR FORCE AIRCRAFT		
F-16C/D (Fighter)	985.1	33.3
KC-10A (Tanker)	72.0	29.6
TR-1/U-2 (Reconnaissance)	41.7	19.8
AIR FORCE MISSILES		
GLCM (Ground-Launched Cruise Missile)	10.8	1.9
TOTAL	2798.7	

Senate Budget Committee Staff, January

It has helicopters that fire missiles at ships, and we chose as a result of congressional reductions, we were able to save about $2.8 billion without any reduction in the quantity of these particular weapons.

I realize that some of those savings resulted from management reforms that were implemented by your team at the Pentagon. I want to compliment you for that. Some were low inflation. Some were improved foreign currency rates, and I commend you for all of that. But the bottom line is that we would have never seen these savings had Congress not decided to look below the top line. And we had this discussion with Senator Domenici and myself, or you, and others about pricing. So there have been some pricing changes.

From the time you submit your budget and we begin to look at these things, it looks like there are times when we can take advantage of some of these savings, and we have been able to do that without cutting numbers. You pointed to other systems in which numbers were cut. But certainly there are an awful lot of systems that we have the same numbers.

Secretary WEINBERGER. We are delighted to have any savings that could be found anywhere. I do feel, Senator, without having the opportunity to go through this chart in detail since it has just been displayed that quite a few of the earnings did result in the factors you mentioned with respect to improved management and things of that kind. From whatever source, savings are always welcomed.

TARGETS ARE QUESTIONED

Chairman CHILES. Mr. Secretary, CBO estimates that we are about $60 billion short of the $108 billion target for 1988. The President has proposed about $19 billion in domestic cuts this year. My friend from New Hampshire, who is not here right now, said we would be lucky if we got half of that, and he might be a bit optimistic. If we don't, and we split the remainder down the middle via the Gramm-Rudman formula, Defense would be looking at a $25 to $30 billion outlay sequester or budget authority reduction $60 to $70 billion.

I have said it before, and I will say it again, that would result in a self-imposed Pearl Harbor if we had that. There are a lot of us in this committee and a lot in the Congress that do not want to abandon and are not prepared to abandon Gramm-Rudman-Hollings. There are a number of us that would like to see it have a trigger again that might work. When are we going to face the fact that if we want to continue to have this defense build-up, we will have to look at how we can put this together. I think we will have to look, as the President did in his budget, he has $22 billion of revenues for $19 billion of spending cuts, and that is not considered the $8 billion approximate outlay increase for Defense. So you cut that down to about $11 billion.

Are we not going to have to say at sometime we are going to have to face up to pay for that defense if we want to have it.

Secretary WEINBERGER. My impression, Senator, is that the President's budget as submitted for 1988 meets the Gramm-

Rudman targets. If it could be enacted as submitted, all those targets would be met.

Chairman CHILES. Well, there is a little debate on that. The Congressional Budget Office has given us some preliminary figures that say it's about $27 billion short.

CUT WOULD BRING ABOUT SERIOUS ADDITIONAL RISKS

Assume that yours turned out to be right, and I don't want to have you have to say that they could be right, but just assume they did. We get around to October, we get around to facing this thing, and they were right. We were short that much. Then we have to face these kind of cuts. What in the world do you think we should do?

Secretary WEINBERGER. Well, Senator, I don't think you should cut defense. I can tell you that, because I agree with you. I think you would certainly have another very serious additional risk which the Nation should not have imposed on it.

Chairman CHILES. Well, you would want us to break the law, and the law says that we have to follow the GrammRudman-Hollings.

Secretary WEINBERGER. No; I said we have to make the kind of domestic cuts the President has been calling for for quite a long time.

Chairman CHILES. I just said he has only called for $19 billion totally so——

Secretary WEINBERGER. This year. But you could go back and make some of the ones that were not made in prior years.

Chairman CHILES. But these are the same ones that he made in prior years.

Secretary WEINBERGER. I understand that. We have been trying for a number of years to get those.

Chairman CHILES. I mean it is the same list so there is no bigger list that I know of.

So if we take the same list, then where do we go?

Secretary WEINBERGER. What I would suggest very strongly is that we look elsewhere than Defense to make the cuts.

Chairman CHILES. I think you are calling for the chaplain, Mr. Secretary.

Secretary WEINBERGER. Well, Senator, the kinds of cuts that would be required, if they are all taken out of Defense and if they were much greater than last year's amount, would weaken us very substantially. We should all know that.

Chairman CHILES. Admiral, I want to compliment you on your statement. I think it is an outstanding statement, and I think it will help the committee, and I am glad to see that you put that statement together.

DIFFERENT PRIORITIES CHOSEN

Mr. Secretary, you say here it has been argued that in order to reach your top line number this year, it appears that you chose to reduce the production quantities and the number of cases.

It appears to me you chose some different priorities. For instance, in the SDI program, you have elected to increase funding by $2.5 billion or 66 percent. My staff has done a rough estimate on what it might cost to restore high production levels in a number of your major programs. They looked at five major programs, the M-1 tank, the Bradley Fighting Vehicle, the F-15E fighter, and the FH-60B helicopter, and the fast artillery support vehicle. Their estimate indicates approximately $1.4 billion. That is a little more than half that $2.5 billion you put into SDI. We could restore the production levels of 800 M-1 tanks, 142 fast artillery support vehicles, 48 F-15E fighters, 18 SH-60B helicopters, and 716 Bradley Fighting Vehicles.

So I question your priorities when you ask for a 66-percent increase for SDI at the same time that you reduce production on a number of very important conventional systems.

Secretary WEINBERGER. We would much rather not make the conventional reduction, Senator, but the top line only permits very modest growth. After a year of major cuts in the Strategic Defense Program, given the high priority that we attach to it, we believe the choice of priorities is right.

Chairman CHILES. Is a modest increase 66 percent of SDI or——

Secretary WEINBERGER. No; in the overall top line of the budget. We had deep reductions in strategic defense last year. We do not believe that we should cancel research programs that are well underway and show very great promise. We don't believe there is any way of calculating the benefits to the Nation and the world if this program can work, and we believe it can. But it will take funding to prove that.

Chairman CHILES. Well, I think there is a direct way of calculating what some of those tanks can do for us in Europe, and that is a concern we have too.

Senator Quayle.

Senator QUAYLE. Thank you very much, Mr. Chairman.

Mr. Secretary, welcome back to one of your favorite committees. Over the last few years, even when the Republicans were in charge here, unfortunately you have had a lot of reductions. I am sure now you are thinking, well, gee, if the Democrats have taken over, we are going to have even more reductions. I am not sure that is the case. I think that we are going to sit down, and everybody is going to look at this defense budget very, very seriously.

I was struck by a statement that it is a Coalition for the Democratic Majority, where it says that members of this group said that recent times Democrats of the progressive center have yielded too much to groups with extreme views in the areas of foreign policy and defense.

MORE SPENT ON DOMESTIC PROGRAMS THAN DEFENSE PROGRAMS

Have hope, Mr. Secretary, and we will be able to work with that progressive center in the party to come up with a reasonable defense budget that will be able to meet the threat that you perceived to be out there. It seems that every time we get around to looking at where we are going to reduce the budget deficit in the past it has come out of defense spending. Statistically this administration has spent more in domestic spending since 1981 than it has in defense spending, and I am not counting transfers to State governments. I am looking just at education, health, welfare, and income security programs.

1981 through 1986, you have spent $40 billion more on those programs than we have in defense spending.

Secretary WEINBERGER. Right.

Senator QUAYLE. So it is not defense spending that has caused these deficits, yet every time we make the reductions, it seems that it comes out there. But I think it is going to be different this year. I think a 3-percent growth budget will make people come to realize that the discretionary funding of this defense budget is not a lot.

Take away the pay, which is about 46 percent, you add into the prior contract obligations about 41 percent, you add on any reasonable O&M, and you have got another 3 percent. That gives you about 90 percent of your defense budget. So you have got about 10 percent that you are going to fiddle with, and when it comes down to looking at that, 10 percent is not a whole lot. We are talking about the increase in SDIs at 63 percent. Well, there is about a hundred percent in the budget increase in the Midgetman that many people have demanded that we have, and now the administration is supporting it. But it was a congressional initiative. I have got some concerns about it. We will be raising those concerns not only in this committee but the Armed Services Committee.

You know, if you would just cancel SDI, cancel the Trident missile and the Trident boat, cancel the Stealth bomber, just cancel those four major programs, you are going to save about $5 billion in outlays, less than 2 percent of the defense budget.

LIMITED DEPLOYMENT OF SDI

So when we start talking about where are we going to get those reductions, you know, and talk about big reductions, you are simply not going to take it, first of all, out of the strategic account, even if you would just zero those accounts. But you are talking about dealing with less than 2 percent of the defense budget. You would be interested to know, Mr. Secretary, I came from a hearing just below, about three floors below, where Dr. Brzezinski is testifying before the Senate Armed Services Committee. And he was somewhat endorsing what you talked about yesterday as far as an incremental or a phased deployment of the Strategic Defense Initiative. He was very specific on what kind of a Strategic Defense Initiative that he would like to see. He said that we ought to look at a constellation of kinetic kill space-based weapons and also land-based interceptors, and he would deploy those in the near term. He calls it a limited deployment of SDI, and I think you are beginning to see a bipartisan coalition that is saying, you know, we have to get on with deployment of SDI. Now we have got two witnesses in a row, you yesterday and Dr. Brzezinski today, and I think that this committee ought to know and be able to have some of that testimony with the Senate Armed Services Committee.

SLASHING THE BUDGET WOULD RISK MODERNIZATION

As you look at this budget, and I just think as sort of a macro basis you have used the term that if the Congress is going to cut it, that there are certain risks that this Nation is going to have to incur.

I wonder if you might be able to specify what some of those risks really are as we look at this defense budget? What kinds of risks for the Nation do you foresee if we continue in this direction of having lower defense budget. The last 2 years in budget authority, we have had less than a zero growth, and if we continue and the defense budgets are slashed, what are those risks, Mr. Secretary, from your point of view that this Nation is going to incur? I think it is important that we have a full comprehension of what those risks really are.

Secretary **Weinberger**. Very briefly, Senator, the risks are that we will not modernize, we will not acquire the kind of equipment we need to keep the forces ready, to have them able to be projected to areas where they might be needed, and that we could not be an effective part of either NATO or our Pacific alliances, even though we all agree that all of us need to do more.

We would have an insufficient number of modern aircraft and an increasingly insufficient number of tanks, artillery pieces and hardware. Perhaps even more damaging to the long-term security of the Nation would be major reductions in research and development, not taking advantage of our technological skills and genius. In every way we would not only start falling behind in the important measures, but we would be sending clear signals to the Soviets as well as our allies that we lack the will and the resolution to make the effort necessary to maintain our freedom. That, I believe, would probably discourage a lot of allies not only from doing enough but perhaps encourage them to take far more neutral positions that could hurt us immeasurably if the alliances on which we rely became ineffective.

Senator **Quayle**. Thank you, Mr. Chairman.

Chairman **Chiles**. Senator Riegle.

Senator **Riegle**. Thank you, Mr. Chairman.

We have had trade hearings going on in the Finance Committee this morning and meetings going on in the Budget Committee, so many of us have had to go back and forth between those committees. So this will be my first opportunity to question you, Mr. Secretary.

MONEY BUDGETED FOR DEFENSE SPACE PROGRAM

Let me ask you how much money you have in this budget for the defense space program in total. I mean by that all activities in space that you anticipate for the coming year.

Secretary **Weinberger**. I will have to get it for you. The strategic defense program is primarily a space-based program. We obviously have other space activities. We also are supporting the shuttle recovery program to a considerable extent because we have payloads that would ride on the new shuttles when they go in. I will have to get the total amount for you.

Senator **Riegle**. I appreciate your doing so. I want to go a little bit further with it today if we can. If there is anybody in the room that has some of this information please speak up—am I right in thinking that the defense space program is in the range of about $15 billion or thereabouts?

Secretary WEINBERGER. Fifteen?

Senator RIEGLE. Fifteen, yes.

Secretary WEINBERGER. I would prefer to state the facts than speculate, Senator. What we have requested for strategic defense is in the five range, and I will have to get the others. I think that is a little high.

Senator RIEGLE. Can you tell me if it is broken out as such as a line item within the defense budget?

Secretary WEINBERGER. Not specifically. We don't submit a space program as part of our budget. We would have to assemble it through various pieces of the budget.

[The following was subsequently supplied for the record by DOD:]

DOD FISCAL YEAR 1988 SPACE BUDGET

At present, the space program is not defined as a major defense program (like strategic forces and general purpose forces) or a major mission area (like strategic programs and tactical programs). In part, this is because many space-related activities support a variety of major mission areas. Moreover, while some program elements have an application limited strictly to space (e.g. Satellite Control Facility), others are more complex and may only partially support space applications (e.g. advanced propulsion). For these reasons it is difficult to establish accurately a single dollar figure that encompasses our entire space program. However, our estimate is about $17.5 billion in the fiscal year 1988 Budget. I would prefer to provide you a firm figure for those programs that are totally space related and have asked the Services/Defense Agencies to identify them. We will provide that information to you within the next two weeks. We will also continue to refine the space related costs to other programs having some space applications.

CONSOLIDATE DEFENSE SPACE PROGRAM

Senator RIEGLE. I pose the question because I am assuming the chairmanship of the Space Subcommittee that oversees NASA and, as you know, we are very much involved in making the repairs that are needed to get the shuttle system going and so forth. And there is a real question about defining the resources in the civilian NASA program, although obviously they do a certain amount of defense work for you. But to find the money to do all the things that are on the drawing board, the space station, the replacement shuttle, a variety of other things, I think it would be very helpful if we could get the defense space program aggregated in one area of the budget so that it was not scattered all around and very hard to see and understand but to get it in one spot, consolidate it. Is there any reason why that can't be done on an ongoing basis?

Secretary WEINBERGER. There are a number of technical reasons why it is difficult, but we can assemble it from these various places and submit it to you.

Senator RIEGLE. I would appreciate that.

[The following was subsequently supplied for the record by DOD:]

DOD SPACE BUDGET AGGREGATION

As I stated before in response to your previous question, we will shortly provide you a listing of those programs that are 100% space related. However, I do not believe it would be practical or lead to the best management of space programs to aggregate all space related funding in one place in the budget. The space programs utilize many different appropriations which have different applications, including MILCON, RDT&E, O&M, and procurement. All three Services and a number of Defense Agencies (which have separate budgets, contracting activities, management responsibilities and expertise) are involved in the space program. This ensures that each organization's unique needs are met and their talents utilized. Also, a large number of programs are partially space related and it is difficult to estimate how much of these programs to assign to a space budget.

Senator RIEGLE. My understanding is, and I have asked the GAO to take a look at this, because it is hard to track it down. But it appears to me that the defense space program is roughly twice the size of the NASA space program, and the defense space program has been growing very rapidly. And I am not sure that anybody is monitoring it in the sense of looking at it as an entity simply because it is, I gather, a lot of bits and pieces that are different places and therefore——

Secretary WEINBERGER. No; Each piece is looked at very carefully. But we have had a much larger expenditure than expected in connection with the *Challenger* tragedy.

Senator RIEGLE. Do you happen to know that figure offhand roughly?

Secretary WEINBERGER. Not really. It is not assembled in any one place now, but we will get it for you.

Senator RIEGLE. And you will do so then for the committee?

Secretary WEINBERGER. Sure.

NO DUPLICATION OF SPENDING

Senator RIEGLE. I appreciate that, and the sooner we can get that, the better, because we are going into the NASA hearings and I don't want to have duplicate spending. If something is being done on your side, I would not want to see a duplicate of the thing done on the NASA side or vice versa.

Secretary WEINBERGER. We have worked very closely with NASA, and we believe there is no duplication. We know that we are doing a great deal more than in the past because of the added burdens of the Challenger tragedy. I am sure there is no duplication, but we will be glad to get the figures for you.

[The following was subsequently submitted for the record by DOD:]

DOD SHUTTLE RECOVERY COSTS

The total DOD expenditure associated with the *Challenger* recovery approximates $7 billion. However, the net expenditure, after applying savings resulting from the reduced manning at the Vandenberg shuttle launch facility and recovery of shuttle flight charges, would more likely approximately $3.3-3.9 billion. The final cost is contingent upon final determination of the actual savings resulting from the recovery of shuttle flight charges.

The DOD expenditures include the costs for a 24 month shuttle standdown, payload storage, expendable launch vehicle service extensions, dual compatability for critical national security payloads, the medium launch vehicle program, additional Titan IV production, payload modifications, and shuttle/Centaur termination impacts.

Senator RIEGLE. The civilian NASA operation is under tremendous cost pressure, as you may know, if you've talked to Dr. Fletcher recently and others, both to make the mandated fixes ordered by the Rogers Commission and otherwise bring in the scientific personnel that are needed. They are really scrambling to come up with sufficient budget authority to do the things they think they need to do as a minimum. So I think there is a question of how we are dividing these resources. I am not sure that we need two space programs frankly, the civilian one and the defense one. I think maybe we just ought to have one and it ought to be consolidated in one area that we understand a little more clearly.

Secretary WEINBERGER. I don't think we have two space programs, Senator. We have a space program with several different missions, some civilian and some military. Certainly the military ones are necessary and are being postponed far longer than we like because of the lack of equipment.

Senator RIEGLE. Let me ask you in a different area.

As I look at the general breakout of the budget, and at what the President has asked for, if the numbers are all correct, it shows a deficit for the coming fiscal year, the 1988 year, of $108 billion roughly.

Looking at the components of the budget, if you take out social security and medicare, which are self-financing programs, that is at the present time they generate their own revenue, and if you set aside the national debt service, which is sort of a strange category by itself, and consider just the direct spending, defense spending and nondefense spending, they are roughly equal in this projected budget.

In your mind, would that allow you to take the step to say that if the direct spending that is non-self-financed in the Federal budget yields a deficit of $108 billion, and defense is roughly half, and nondefense is roughly half, that half the deficit is attributable to defense and half of it is attributable to non-defense spending?

SELF-FINANCING IS UNREALISTIC TERM

Secretary WEINBERGER. No, sir, I wouldn't think that. I think self-financing is a rather unrealistic term. It is all part of the total type burden that everyone has to bear. While there is certain earmarking and certain allocations to the revenues, frequently those are intended for other purposes.

I look at it as a unified budget, and I think that our contribution to the deficit is comparatively small. I think all of our studies show that if you take a dollar of defense spending and reduce it, you don't reduce the deficit by the dollar, you reduce the deficit about 50 cents; that is because we generate a great deal of revenue and a great many jobs. Again, that is not a reason for defense spending. We should not spend any more than we need. But we think we need a great deal more than we have had in the last couple of years.

Senator RIEGLE. So what kind of an estimate would you make then—what part of the $108 billion deficit in this budget would be attributable to defense?

Secretary WEINBERGER. We have a chart on that, but I would not be able to guess. I don't know. I would have to analyze all the figures. We have not done it that way. The contribution of the Defense Department to the deficit has been steadily reduced, and the tax revenue that is generated from Defense spending needs to be considered.

As I say, if you cut defense a dollar, you only get 50 cents in deficit reduction.

Senator RIEGLE. Well, in some part of the deficit, and I would assume that even if you give it a minimal value, because the deficit is so large, it still has to be in the tens of billions of dollars, does it not?

Secretary WEINBERGER. You have a $108 billion deficit predicted for 1988, and you have a very small increase which is attributable to defense appropriations from prior years. I think the great bulk of the deficit is attributable to the enormous growth in non-defense programs that we illustrated on this chart a few minutes ago.

Senator RIEGLE. Actually, we have held those down quite well. If you take the self-financing programs for Medicare and social security to the side, because they have their own revenue source, and those accounts are in balance now, the defense build-up has actually been a very major contributor to the deficit. Perhaps you don't agree with that view, but I think most people hold that view.

BUILD-UP OF DEFICITS POSING STRATEGIC DANGER

But it is very interesting, as I have just come from the Finance Committee, the general perception is that the build-up of the deficits are now to a size where they are posing a kind of strategic danger to the country, almost like a military threat. We have over a $2 trillion national debt now, and we're headed for $3 trillion. We are on our way to a trillion dollar foreign debt. We are the number one debtor nation.

And I am wondering how long we can continue, whether it is defense—you are contributing part to the deficit—or non-defense programs, can we continue to just pile these deficits up year after year. Aren't we at a point where if we are going to do this spending, maybe we ought to find a way to pay for it or maybe we ought to do less spending.

Secretary WEINBERGER. We did pile up very large deficits for about the last 38 of the last 40 years I suppose.

Chairman CHILES. It took us 200 years, Mr. Secretary, to reach the first trillion dollars, and it took us 6 years to reach the second trillion.

Secretary WEINBERGER. A lot of inflation all over. What I need to consider is——

Senator RIEGLE. I thought inflation was under control.

Secretary WEINBERGER [continuing]. Not the size of the deficit but the necessity for keeping the country strong so that we can still have some time to worry about deficit. If we don't keep our strength in our freedom, Senator, we will not need to be concerned with any of these problems, and it will be a vastly worse world for us all.

Senator RIEGLE. Well, I am not sure we disagree about that. We have to be strong militarily. We also have to be strong economically. And I don't think we can let these deficits mount up the way they are. And I think the Defense Department has some obligation to find a way to pay its bills, just like every other part of the budget. I don't think you should be exempt from the discipline. I don't think you should view yourselves as having a free ride and contributing to the deficit any more than any other area of the budget.

PROTECTING THE NATION EXTREMELY IMPORTANT FUNCTION

Secretary **Weinberger**. I don't think we view ourselves that way. We view ourselves as protecting the Nation which I think is an extremely important function to fulfill.

I don't think it is a free ride. No one has suggested that health or education or welfare or any of the other activities I used to be associated with had to have special taxes to support them, and I haven't heard any suggestion that defense have that.

Senator **Riegle**. Well———

Chairman **Chiles**. I am afraid I have to rein you in.

Senator **Riegle**. Very good.

Chairman **Chiles**. Senator Domenici has been waiting for a turn.

Senator **Riegle**. All right. Fine.

Senator **Domenici**. Thank you very much, Mr. Chairman.

I want to say, Senator Riegle, I have not asked any questions yet.

Senator **Riegle**. I don't mean to take up your time either, I assure you.

Senator **Domenici**. Let me first compliment you, Admiral. I believe the statement that you made to us should be heard and read by many more people and many more members of this body. And I am going to do my share to get some of those remarks out.

Let me also suggest to you, Admiral, and I know you don't need this, but if you have any reluctance at all making the kinds of statements you made today in terms of your role, I hope you will get rid of them and I hope you will speak out.

Frankly I am impressed. I was telling my friend, the Chairman, that in one of his papers, the Orlando Sentinel, there was a summary of the two major pollsters in the United States, their end of the year wrap-up on what the American people believed—I hope you have seen them.

Admiral **Crowe**. I have, sir.

Senator **Domenici**. You don't have to see the particular article because it has a conservative slant to it. Nonetheless, you can't do away with the polls' results. Basically you as part of the leadership of the military in the United States ought to be congratulated today.

Admiral **Crowe**. Thank you.

AMERICANS HAVE HIGH CONFIDENCE IN MILITARY LEADERS

Senator **Domenici**. Because military leaders of the United States, as of the end of 1986, according to the two major pollsters, have more credibility, that is, the American people have more confidence in you than any other institution around, period. More than the churches, more than the bankers, more than the doctors, more than Congress, and I regret to say more than television. They are almost in that order with television being last.

Admiral **Crowe**. That television finding doesn't surprise me, Senator. [Laughter.]

Senator **Domenici**. Well, actually, you know, the churches went down a little. That's why we cannot be totally pleased with these results, but you have to strike while the iron is hot, while you are hot. The churches went down because everybody thinks they are getting involved in your business.

Admiral CROWE. That is right. They got my Methodist bishops for that hymnbook; I sort of enjoyed that.

Senator DOMENICI. And they also think perhaps they are getting involved in our business a little too much. Being a Catholic, they have really gone down recently.

Senator JOHNSTON. They are getting involved in the weather, too.

Senator DOMENICI. The weather, everything, right. [Laughter.]

In any event, let me move on here for a minute. Mr. Secretary, I really think that since we are getting very close, in this Senator's opinion, anyway, to fixing this deficit and putting something in place, we have a chance of putting something in place multi-year that is rather permanent before President Ronald Reagan leaves office.

We are going to work on it, hopefully, together following the Gramm-Rudman-Hollings targets. I do not think we ought to get off on any tangents where your arithmetic and your assumptions and calculations are different from ours, and I do not think you intend that.

I think you intend in every respect to be very forthright, and I want to correct a statement I made right off. I was in error with reference to that chart that I talked about earlier because I had seen them before and I did not read carefully. Your good budget man, who used to work for us, has reduced that to a much different flow this year.

That is in real terms, the ones I was arguing with, in real growth, and you used 1984 dollars. So that does not have the inflation, the extra costs of contracts, and all of those items that we found previously had to be adjusted to reality.

WHAT WAS GIVEN UP IN 1988 OVER 1987 PROPOSALS

So I would ask this. In light of what I understand, will you put in the record, if you have not yet, exactly what it is that you have given up in the 1988 over 1987 proposals.

Secretary WEINBERGER. Yes, sir.

Senator DOMENICI. Since both were multi-year, we now have a comparison and we would like to have those. You have those ready. You can make those available, can you not?

Secretary WEINBERGER. We have them, indeed, sir. We have charts here and everything, yes, sir.

Senator DOMENICI. All right. That means, as I understand it, Mr. Chairman, that we will have in this record, as compared with the past when we could not quite do this.

The difference is what they are now going to lose in this request of 3 percent versus the previous one. Is that——

Secretary WEINBERGER. We can get that for you, Senator, sure.

Chairman CHILES. Well, I hope you will delineate for us whether those were based on cost constraints or whether some of them were policy decisions that were made by the Congress and/or the Administration.

Secretary WEINBERGER. Well, we would——

Chairman CHILES. Reduction of MX was a congressional policy decision. That was not a budget decision.

Secretary **Weinberger**. The Congress, in many cases, has reduced the funding specifically. We will indicate where those reductions have come, as well as reductions that we have made in the 1988–1989 budget.

Senator **Domenici**. Well, Mr. Chairman, let me suggest to you, the purpose of my question and the purpose of getting this in the budget has nothing to do with who did it, but rather where we are.

Secretary **Weinberger**. Yes.

Senator **Domenici**. I mean, I do not care if you went down fighting and yet the appropriators cut something. We want to know what it is that you did not get in your new submissions that you expected to get, based on the previous approved multi-year plan that went through.

Secretary **Weinberger**. We will submit it that way.

[The following was subsequently submitted for the record by DOD:]

DOD PROGRAM REDUCTIONS DUE TO FUNDING CONSTRAINTS

As I mentioned earlier, the adjustments we have made to the Defense plan have occurred in two stages. The first set of adjustments were made in the DOD program and budget review in response to federal fiscal contraints and in response to the levels established for defense in the budget resolutions. The second set of adjustments reflect Congressional reductions to the budgets submitted by the President. As I understand the Senator's question, it is not too assess what the Congress cut or what past adjustments have been made to the Defense plans but what specifically is not in the FY 1988-FY 1989 budget that was expected based on the previously approved multi-year plan.

Since the last plan was approved, for Defense, and this would have been in January 1986 in conjunction with the FY 1987 budget submission, there are substantial programs that we could not fit into our new submission in the FY 1988-FY 1989 budget. We are not able to provide the level of compensation and benefits for our military personnel that was planned last year. We are not able to provide the level of training, maintenance, or accomplish the level of effort that was planned in research and development, military construction, and family housing. The largest deletions from our plan occur in the procurement of weapons. The following table provides a list of program deleted between January 1986 and January 1987 because of funding constraints:

MAJOR INTERNAL DOD PROGRAM REDUCTIONS DUE TO FUNDING CONSTRAINTS JANUARY 1986–JANUARY 1987

	Quantities—	
	Fiscal year 1988	Fiscal year 1989
Tactical Aircraft	−106	−121
P-3C Aircraft	−9	−9
UH/EH-60 Helicopter	−30	−24
AHIP	−32	−64
M-1 Tank	−240	−245
Bradley Fighting Vehicle	−254	−252
IR Maverick	−5,226	−5,109
Ammunition Resupply Ship	−1	...

Senator **Domenici**. All right. Now, second, you have not figured the percent increase in terms of your use of real growth. You have not figured it differently this year than you have in the past?

Secretary **Weinberger**. No, sir. We are all talking the same base, and I agree we should all work from the same base. To the best of my knowledge, we are.

Senator **Domenici**. Now, also, Mr. Secretary, the amount of pay increase has an important bearing upon the use of the words "nominal growth," and I understand we are consistent there, also.

Secretary **Weinberger**. Yes, sir.

Senator **Domenici**. Excepting that we must understand that you are asking for a 4-percent pay increase, is that not correct?

Secretary **Weinberger**. In January of the next fiscal year, yes, sir.

Senator **Domenici**. So to the extent that we do not want that to happen, if that is the case—and I am not suggesting that I am one that does not want it to happen—then obviously you can reduce the growth by reducing that pay and that will be figured in your nominal and your real growth.

Secretary **Weinberger**. Yes; you would also reduce the morale and the fairness.

OUTLAYS MUST BE FIGURED

Senator **Domenici**. I understand. Now, my next question has to do with we seem to be engaged now in an argument about how much did defense really get cut in 1986 and 1987. I would hope that there again we would not get in a minority/majority squabble over how much you were cut in 1986 and 1987.

I assume that even though you base your entire calculations on budget authority, which has been the historic way of doing it, Mr. Secretary, I assume you know that we have a very onerous job now under Gramm-Rudman-Hollings in that we must figure outlays. You understand that?

Secretary **Weinberger**. Oh, yes, sir.

Senator **Domenici**. And we have to do it every year, and I would hope that you would help us with that because——

Secretary **Weinberger**. We have the outlay figures as well as the authority figures.

Senator **Domenici**. All right, so we will get those comparisons, also, so we all start with apples and oranges, hopefully.

Secretary **Weinberger**. They are all on the original charts, all of those figures, but we will be glad to supply them individually.

Senator **Domenici**. How confident are you getting in outlay estimates?

Secretary **Weinberger**. It is a matter of historical ratios and averages. It is always a guess; you never hit it precisely. For example, personnel costs outlay at about 95 to 98 percent the first year, or some such figure as that, based on historical averages.

Carriers, for example, will only outlay totally after 7 years. We have the ratios over the years and we can make some pretty good assumptions, but that is all they are because actual outlays is a matter of when you write the check and when you pay the bill.

4-YEAR BUDGET WOULD BE ADEQUATE

Senator **Domenici**. Admiral, if we were doing a 4-year budget, subject to a minimum number of vagaries which have to occur, but a minimum number, and using the same assessment you have made in your summary here to this committee as the leader of the military in the United States, would the budget as presented, with the growth in each of those years as prescribed by the current administration—if we were able to assure that for the next 4 years, and again put in whatever qualifiers you want, absent some different conduct on the part of the Soviets or something, would that be an adequate defense budget, in your opinion?

Admiral **Crowe**. Well, it certainly would be better than peaks and valleys, Senator, and it is my view that if we had a policy in this country that assured even very modest growth over a long term that we could very quickly have an adequate defense budget, and we would have the kind of planning predictability that would allow us to save a great deal of money and also get more for our money than we currently do.

You can actually plot going back some ways, if you take 1 or 2 percent, and oppose it to what we have done in the actual defense budget, and we would have more than we have today even with the build-up that we have undergone the last few years.

Senator **Domenici**. So is your answer, then, that that would be adequate, in your opinion?

Admiral **Crowe**. I would think that it would reduce risk and, well, yes, be adequate.

Senator **Domenici**. I thank you.

Chairman **Chiles**. Senator Johnston.

Senator **Johnston**. Thank you, Mr. Chairman.

First, let me state I very much hope we can avoid these peaks and valleys, Admiral Crowe. That has been our biggest problem, and the 2-year budget is a good step in that direction.

A couple of very quick questions which I hope we can get some quick answers on.

Secretary **Weinberger**. I will certainly give very quick answers, Senator, because I am over an hour late for my next engagement. I will give them just as quickly as I can.

SALE OF ARMS TO IRAN DISCUSSED

Senator **Johnston**. I will be very quick.

Were you consulted on Iran, the sales of arms to Iran?

Secretary **Weinberger**. On the sale of arms to Iran?

Senator **Johnston**. The giving of arms, the sale of arms to Iran.

Secretary **Weinberger**. The matter was discussed at a couple of meetings at which I was present in the Oval Office, yes, sir.

Senator **Johnston**. And were you asked for your advice on that?

Secretary **Weinberger**. Yes.

Senator **Johnston**. And were you asked orally or in writing?

Secretary **Weinberger**. Orally.

Senator **Johnston**. By whom?

Secretary **Weinberger**. By the President, and I have very great reluctance, Senator, in talking about the advice I give the President. He has specifically directed me to feel free from the concern for confidentiality that I normally maintain. I have testified and stated many times that I opposed the sale and argued against it. I do not think there is any mystery about that.

When the matter was first proposed in a written paper from the NSC, I also opposed it.

Senator JOHNSTON. Was that in a Cabinet meeting or at a personal meeting with the President?

Secretary WEINBERGER. These were not Cabinet meetings. They were small gatherings of members of the NSC with the President.

B-1 WILL FULFULL ITS MISSION CAPABILITIES

Senator JOHNSTON. I see. One final question. It has been reported with respect to the B-1 that with a full weight, fuel and weapons, it cannot fly at its regular altitude, its high altitude, but must restrict itself.

If I recall the figure written in the Post, it was something like 18 or 20,000 feet. In any event, with full weapons and fuel, it cannot fly at its programmed altitude, is that correct?

Secretary WEINBERGER. No; I do not think that is correct, Senator. The B-1B was not designed to be a high flyer. Instead it was designed to carry a full load of external cruise missiles, launch them from outside the Soviet Union, and to penetrate Soviet airspace at extremely low altitudes. It will meet its programmed and mission responsibilities, and it will be able to go both as high as it is supposed to—about 20,000 feet at maximum gross weight—and as low as it is supposed to.

There are things that are being done to mature and to improve its capabilities, as I mentioned, but we are satisfied that it will fulfill its mission capabilities.

Senator JOHNSTON. And that is completely untrue about it having to lower its altitude with full weapons and fuel components in its initial stages?

Secretary WEINBERGER. I will verify it. I have not heard that particular charge before. We have heard a lot of others. I will verify that, but my understanding is that the plane meets all of its requirements and all of its mission responsibilities.

Admiral CROWE. I can clarify that. There is a limit that it can go with a full load of fuel and weapons, but that was not a requirement for the aircraft. The capability that they were designing into the aircraft was to fly lower than the current aircraft do, and to do it faster and to be a penetrator at 200 feet.

Senator JOHNSTON. Well, the idea was that at lower altitudes it burns more fuel, so it therefore restricts the range.

Admiral CROWE. But the capability the design was looking for was that; that is where the advance is and that is where the requirements for a new bomber come.

Senator JOHNSTON. But it must restrict itself to the lower altitudes, then?

Admiral CROWE. Well, no. It depends on load, as all aircraft do.

Senator JOHNSTON. I say at a full load.

Admiral CROWE. Well, at a full load, I think it is about 20,000 feet and it meets its specified range requirements at these altitudes.

Secretary WEINBERGER. That was what was asked for and it has a much lower radar cross-section. A lot of the missions require it to go at 200 feet, and it will.

Senator **Johnston**. I understand that. Thank you, Mr. Secretary.

[The following was subsequently supplied for the record by DOD:]

B-1 CAPABILITIES

The B-1B was not designed to fly at high altitudes. It was designed to fly low and fast with heavy payloads and, in this critical arena, its performance is excellent. At its heaviest weights, with full fuel loads and payloads, the B-1B flies at about 20,000 feet, as we expected. The critical fact is the aircraft meets its full specified range and targeting requirements flying at the lower altitudes needed to penetrate.

Chairman **Chiles**. Mr. Secretary, we thank you very much for your attendance. There are several questions Senator Hollings would like to ask for the record and I would like to submit those to you.[1]

MULTI-YEAR PROCUREMENT SUCCESSFUL

And I just wanted to ask you—just a minute, Admiral—last year, I sponsored a major piece of legislation aimed at increasing production efficiency by increasing the level of multi-year procurement to ten percent in 1988.

How successful have we been in reaching that goal, do you know?

Secretary **Weinberger**. I can get that for you, Senator.

Chairman **Chiles**. If you do not know, please get that to me.

Admiral **Crowe**. I do not know that we meet the exact percentage. I do not know, but we have been very successful in multi-year projects.

Chairman **Chiles**. Let me know that for the record, if you will.

[The following was subsequently submitted for the record by DOD:]

MULTIYEAR PROCUREMENT

During formulation of the FY 1988/89 budget, all major procurement programs were examined to ascertain the most advantageous acquisition strategy. As a result of that review, nine percent of our procurement funds utilize multiyear contracts in FY 1988. The balance of the programs do not meet one or more of the congressionally mandated criteria for multiyear procurement.

Chairman **Chiles**. Thank you very much.

Admiral **Crowe**. Thank you, sir.

Secretary **Weinberger**. Thank you very much, sir.

[Whereupon, at 12:47 p.m., the committee was adjourned.]

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[1] See p. 201.

WRITTEN QUESTIONS FROM SENATOR HOLLINGS TO SECRETARY WEINBERGER AND THE RESPONSES

ACTIVE AND RESERVE PROJECTED FORCE LEVELS

Question. Could you please provide current and projected force levels (active and reserve forces) by military Service—through 1995?

Answer: The current Five Year Defense Program projects force levels through FY 1992. Programmed levels are as follows (in thousands):

	Fiscal year—					
	1987	1988	1989	1990	1991	1992
Active forces:						
Army	780.8	780.9	780.9	780.9	780.9	780.9
Navy	587.0	593.2	603.8	610.4	617.3	617.3
Marine Corps	199.6	199.6	200.1	200.6	201.6	202.9
Air Force	606.8	598.7	600.6	599.7	601.0	601.0
Total	2,174.2	2,172.4	2,184.4	2,191.6	2,199.0	2,202.1
Reserve forces:						
Army National Guard	452.7	458.8	464.9	487.7	492.1	495.2
Army Reserve	319.4	330.4	339.1	343.2	344.9	351.6
Naval Reserve	149.5	157.4	161.7	170.4	170.7	171.8
Marine Corps Reserve	42.8	43.7	44.5	45.2	45.5	46.2
Air National Guard	113.4	116.7	117.7	118.7	118.4	117.5
Air Force Reserve	79.6	83.3	85.5	86.2	86.7	87.2
Total	1,157.3	1,190.3	1,213.3	1,251.4	1,258.3	1,269.5

COMPOSITION FIGURES

Question. What are the Black and other minority composition figures of the total active enlisted forces? By Service? By combat skills?

Answer.

I. Total (DOD) Active Enlisted Force (1,845,110)

Black	390,764
Hispanic	74,886
Other/unk	77,395
Minority total	543,045

A. Army Enlisted Force (667,402):

Black	197,647
Hispanic	26,523
Other/unk	26,478
Minority total	250,648

B. Navy Enlisted Force (504,369):

Black	71,490
Hispanic	20,700

Other/unk	28,861
Minority total	121,051

C. Air Force Enlisted Strength (494,666):

Black	84,941
Hispanic	18,435
Other/unk	16,788
Minority total	120,164

D. Marine Corps Enlisted Force (178,673):

Black	36,686
Hispanic	9,228
Other/unk	5,268
Minority total	51,182

II. Total (DOD) Active Enlisted Force in Combat Skills Occupations (262,327)

Black	57,930
Hispanic	11,356
Other/unk	9,363
Minority total	78,649

A. Army Enlisted Force in Combat Skills Occupations (164,129):

Black	41,297
Hispanic	7,217
Other/unk	6,516
Minority total	55,030

B. Navy Enlisted Force in Combat Skills Occupations (23,481):

Black	3,309
Hispanic	940
Other/unk	689
Minority total	4,938

C. Air Force Enlisted Strength in Combat Skills Occupations (33,942):

Black	5,049
Hispanic	1,094
Other/unk	871
Minority total	7,014

D. Marine Corps Enlisted Force in Combat Skills Occupations (40,775):

Black	8,275
Hispanic	2,105
Other/unk	1,287
Minority total	11,667

Source: DMDC-3694, September 1986.

NONPRIOR SERVICE ACCESSIONS

Question. Of the nonprior service accessions from FY 1980–1987, what percentage—by service and year—are Black and other minority (listed separately)?

Answer. The table below gives the black and other race percentages:

Fiscal year	Army—		Navy—		USMC—		USAF—	
	Black	Other	Black	Other	Black	Other	Black	Other
1980	30	5	13	3	23	5	15	3
1981	27	5	13	4	18	5	14	3
1982	25	4	13	4	18	5	16	4
1983	22	4	14	4	17	5	14	4

Fiscal year	Army—		Navy—		USMC—		USAF—	
	Black	Other	Black	Other	Black	Other	Black	Other
1984	23	4	15	5	17	6	14	4
1985	22	5	15	6	19	6	15	5
1986	22	5	17	6	17	8	16	5
1987/Q1	22	5	19	5	17	7	16	5

PILOT RETENTION

Question. What are the retention rates for Air Force and Navy pilots for FY 1985–1987 and what levels of shortfalls presently exist?

Answer. The retention rates for the period requested for the Air Force and the Navy are displayed in the following table. The figures for FY 87 are projected.

	Fiscal year—		
	1985	1986	1987
Service:			
Navy	53	46	49
Air Force	59	56	50

The Navy's pilot shortfall at the end of FY 86 was approximately 1,100. At the projected retention rate, that shortfall will not decrease. The Air Force currently has no pilot shortfall in the aggregate. However, if the declining retention rate trend continues, this aggregate inventory will move to a substantial deficit by FY 89/90.

APTITUDE UPDATE

Question. In Marcy 1982, the OASD (Manpower, Reserve Affairs and Logistics) published the "Profile of American Youth"—presenting data on the 1980 nationwide administration of the Armed Services Vocational Aptitude Battery. Could you please provide an update of Table B-1 on page 69 of the publication to include data for the years 1984–1987?

Answer. The tables below give the data by Armed Forces Qualification Test (AFQT) Category:

Category	Army	Navy	USMC	USAF	DoD
Fiscal year 1984:					
I	5.2	6.6	4.0	7.5	5.8
II	27.8	33.5	27.8	38.4	31.2
III	53.9	49.4	60.9	52.4	53.4
IV	13.1	10.5	7.3	1.7	9.6
Fiscal year 1985:					
I	3.7	4.1	3.1	5.7	4.2
II	32.6	34.6	29.4	38.5	34.1
III	55.2	51.6	63.8	54.9	55.0
IV	8.5	9.7	3.7	0.9	6.7
Fiscal year 1986:					
I	4.2	3.7	3.0	5.0	4.1
II	33.3	32.0	33.5	40.8	34.5
III	58.7	54.2	63.3	53.9	57.0
IV	3.8	10.1	0.2	0.3	4.4
Fiscal year 1987/first quarter:					
I	4.9	4.9	3.6	5.0	4.8
II	38.6	34.2	35.8	41.7	37.7
III	53.2	48.9	60.4	52.9	52.7
IV	3.3	11.9	0.2	0.4	4.8

DRUG AND ALCOHOL PROGRAMS

Question. What are the costs of the programs (by Service) for drug treatment? How many First and Second Term enlistees leave the Service prior to their commitment date due to drug/alcohol problems—list by Service? Provide an estimate for not only drug program costs, but also costs to the military units for lost time and disciplinary activities. Please provide the information for 1985-87 and include drug/alcohol as applicable.

Answer. The drug treatment programs of the Military Departments expended or are budgeted to spend in FY 85-87 as follows:

[In thousands of dollars]

Fiscal year	Army	Navy[1]	Air Force
1985	4,605	8,458	5,383
1986	5,980	7,931	5,665
1987	7,343	8,170	5,428

[1] Includes Marine Corps

The Service members discharged for drug abuse or failure to complete drug or alcohol rehabilitation in FY 85, the only year for which complete data are available are as follows:

	Drug abuse	Rehabilitation failure	Total
Army	3,110	3,697	6,807
Navy	5,305	496	5,801
Air Force	3,869	394	4,263
Marines	1,497	256	1,753
DoD	13,781	4,843	18,624

The Department of Defense has not undertaken to estimate the costs of time lost as a result of drug and alcohol abuse or of disciplinary activities. Such an estimate would inherently involve unreliable approximations of such items as lost efficiency of individuals and use of enforcement resources, so that it is impossible to accurately estimate such costs.

STUDY DUE MARCH 15

Question: Senator Quayle offered an amendment to last year's Authorization bill requiring a study on technology, schedule and cost for a near-term BMD deployment. Will you complete the study soon, and can you indicate when such a site defense capability can be deployed?

Answer. Section 215 of the FY 1987 Defense Authorization Act requires us to submit a report by March 15, 1987, detailing what Strategic Defense Initiative technologies can be developed or deployed in the next 5 to 10 years, and including an estimate of funding and operating dates. We plan to submit the report by March 15. At this time it is premature to estimate a specific date for potential deployment.

POSEIDON SSBN OVERHAULS

Question. It costs about $25 million to dismantle a POSEIDON submarine and $150 to $170 million to overhaul one. Why are we dismantling the subs when a decision has been made not to unilaterally adhere to the SALT Treaty? The funds for the two carriers could be used to overhaul the subs.

Answer. As part of the U.S. decision on Interim Restraint Policy in May 1986, the President decided to dismantle, rather than refurbish, two older U.S. POSEIDON submarines due to existing economic and military considerations of cost effectiveness. These dismantlements kept the U.S. in technical compliance with SALT II until the 131st ALCM equipped B-52 bomber entered service last fall.

No additional POSEIDON SSBN dismantlements are planned. The U.S. plans to overhaul and retain POSEIDON SSBNs until they reach the end of their planned service life.

NATIONAL SECURITY

WEDNESDAY, FEBRUARY 18, 1987

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 9:40 a.m., in room SD-608, Dirksen Senate Office Building, Hon. Lawton Chiles (chairman of the committee) presiding.

Present: Senators Chiles, Riegle, Exon, Wirth, Conrad, Domenici, Symms, Grassley, and Kasten.

Staff present: Richard N. Brandon, staff director; Douglas Cook, group leader for national security; and Randy DeValk, staff analyst for national defense.

For the minority: G. William Hoagland, staff director; Charles Flickner, senior analyst for international affairs; and Paul Heilig, senior analyst for defense.

OPENING STATEMENT OF CHAIRMAN CHILES

Chairman CHILES. Good morning, gentlemen. Thank you for appearing before the Budget Committee this morning. Admiral Zumwalt and General Kent, we value your experience in the Pentagon and your overall knowledge of military affairs. Dr. Epstein, you are a Brookings expert on the defense budget, and we value your analytical skill and your insights.

REAL DEFENSE, NOT REAL GROWTH

Each year, the committee is faced with difficult decisions on defense spending, and we have to make a judgment based on a host of national priorities and decide how much goes for defense. For the past several years, that decision has been characterized in terms of the need for real growth between years.

There was a time, a few years ago, when the world was divided between the 5-percent real growth team and the 7-percent real growth team. Predictably, it was argued that the 7-percent real growth team was stronger on defense. Unfortunately, this real growth argument has obscured and somewhat distorted the debate. What we need is some discussion about real defense instead of real growth.

NATO OUTSPENDS WARSAW PACT

Each year, we and our NATO allies outspend the Soviet Union and the Warsaw Pact. Yet, according to the static indicators, tank for tank and airplane for airplane, they are buying more. The question we must ask is are they buying better, and if so, what do we have to do to keep pace. If not, where should we place our priorities to maintain and improve our deterrent posture.

In what was generally an outstanding and informative ~~statement,~~ statement Admiral Crowe recently warned our committee that we cannot afford to stand still in the face of continuing Soviet buildups. Yet, in fiscal year 1988, the budget, despite the fact that it only seems to grow modestly between years, has room for 29 new starts. This is hardly standing still.

In fact, a preliminary analysis by the Congressional Budget Office indicated that when we account for the planned decreases, we actually have $32 billion in increases between fiscal year 1987 and fiscal year 1988. We can see that if we had no real growth on the top side, we would still have considerable program growth.

Beyond this issue, we need to come to grips with a major pricing problem in the budget. For several years, we have been able to make reductions in programs without an apparent effect on those programs. For example, in fiscal year 1987, we reduced the Sidewinder missile line by 24 percent; no change in the quantities. This indicates we still have a real problem in the defense budget estimates.

Finally, a good deal has been made about the new realism expressed in the President's budget request. This year's request, unlike previous years when the real growth in the budget was always in double digits, only asked for 3-percent real growth. It appears that we are headed for some kind of accommodation.

However, I am reminded of the missionary who confronted the lion walking through the jungle one day. The missionary fell to his knees in fear and covered his face with his hands. He looked up after a minute and found that the lion was kneeling, too, and covering his face with his paws. The missionary took heart, and the lion looked up and he said, "I do not know about you, Brother, but I am only saying grace before the meal."

So I do not know whether we are hearing grace or not, but we are hoping that there is an accommodation or that there is the possibility for an accommodation on the defense and the overall budget.

We are delighted, again, to hear from all of you today.

Senator Domenici?

Senator DOMENICI. Thank you, Mr. Chairman.

OPENING STATEMENT OF SENATOR DOMENICI

Good morning, Admiral Zumwalt, General Kent, Dr. Epstein. It is a pleasure to have you here, as the Chairman said, to give us your expert advice on the President's defense budget and perhaps even your own views just on defense in general.

AT CRITICAL POINT IN DEFENSE POLICY

On January 13, about a month ago, we had Secretary of Defense Weinberger and Admiral Crowe before this committee for the same purpose. I have to admit that I was struck, and I believe most members of the committee were struck, with the authoritative and very learned testimony given by Admiral Crowe. As a matter of fact, I called him after reading it thoroughly, to congratulate him, and circulated his testimony to a number of Senators. I will not recount the specific points they made, but let me just say that the Admiral said that we are now at a critical point in our national defense policy. There is no doubt we have made some progress over the last half-decade, but in the last two years we have enacted real cuts in the defense budget authority which, in Admiral Crowe's words, "have required a considerable amount of reprogramming and fine-tuning to avoid either a hollow victory or hollow force."

CBO has done a very interesting analysis of this problem in "The Economic and Budget Outlook: Fiscal Years 1988-1992." They attempt to reallocate all of the transfers, rescissions, and reprogrammings that have taken place in defense in the last 7 years and still estimate funding growth.

That analysis shows real growth in defense spending for the last 6 years has been 27 percent. Nearly half of that occurred in the very first year. Subsequent to fiscal year 1982, we have averaged about 3-percent real growth, a standard we set out for NATO some time ago. Interestingly, about half of that growth has been the result of decreased inflation rather than a specific decision by the Congress to fund an improvement in our national defense.

Looking to the future, if the Congress were to enact the President's defense budget as he submitted—which, I might add, a number of people that I talk to seem to think it is reasonable, whereas heretofore they used to think his proposals were unreasonable—real growth in defense funding for the entire 8-year period of the Reagan administration would amount to about 33 percent. On the other hand, if we were to enact a real or nominal freeze, neither of which I support, total real growth would be considerably lower than 27 percent, perhaps as low as 18 percent, depending upon whether it is a real freeze or a nominal one.

Now, I agree with the Chairman that perhaps we have gotten off-track talking about percentages instead of program needs and defense policies, but I submit that it is very difficult for a Budget Committee to do much more than that when we do not end up deciding the programs in any event; we decide what might fit, and we are sometimes surprised as to what the appropriators can fit within the numbers that we vote in here, and that the Congress ultimately approves.

BUILD-UP MUST CONTINUE

I am very concerned that in these years of enormous deficits, that we might assume that the defense of our country is no more serious a problem than some accumulation of social programs. I really believe we are at risk if we do not proceed with the build-up, and I am delighted that the Chairman has arranged these meetings to hear from you, none of whom are part of the administration or part of the military establishment at this time.

Thank you for your time, and thank you, Mr. Chairman.

Chairman CHILES. Thank you, Senator.

General Kent, we will ask you to start off, please.

STATEMENT OF LT. GEN. GLENN A. KENT, SENIOR STAFF MEMBER, THE RAND CORP., WASHINGTON, DC

General KENT. Thank you, Mr. Chairman.

My purpose today is not to provide a discussion on the present budget or an analysis of the present budget. Rather, I am here to talk about the broader subject of defense planning. Specifically, I am reacting to the desire of the Congress to have a better correlation between means and ends, a better correlation between strategy and capabilities, how increased budgets affect our security, and more specifically, how the procurement of individual pieces of hardware fit into a larger picture.

I submit that in order to do that, you have to operate in somewhat of a rigorous framework, a framework which I will describe. After we are through, you will realize that my framework is not at all new; it is classical, traditional and in some instances, it is practiced.

However, it is not practiced in a systematic way. There is perhaps too much of a tendency in statements by officials of the government to engage in topical subjects and not to start from the top and go down.

Realizing that a dissertation on such a framework is not the most lively listening, I will go through it quite briefly and entertain any questions at the end.

To repeat, the framework I will describe is traditional and classical.

CATEGORIES OF DEFENSE PLANNING

Defense planning can be divided up into five categories, each of which takes place in a typical organizational setting. All of which are obvious to you.

The first one is the matter of national security objectives and national strategy. The forum is the National Security Council in collaboration with the Congress. The results are made known by Presidential decisions, reflected in decision memorandums issued by the National Security Council.

The next element centers around national military strategy. Here I am taking the cue from the Blue Ribbon Commission, from their very fine chapter on national military strategy. National military strategy has several elements to it. The most important element in defense planning is the definition of the military strategy to achieve the objectives. The military strategy is the military dimension of our overall strategy. Military strategy defines the campaigns that we must conduct to underwrite the strategy or the enemy campaigns we must defeat.

To underwrite strategies defines and requires overall capabilities. The overall capability is derived by the synergistic sum of specific operational capabilities. Some people use the word "operational act"—i.e. the capability of specific major elements of our forces to conduct operational acts that in turn provides the overall capability to conduct the campaigns and secure our objectives.

The Chairman of the JCS, at the direction of the Secretary of Defense is at the center of the stage in shaping our military strategy as defined in the Blue Ribbon Commission in Chapter 1 of their final report.

The third element has to do with service secretaries and service chiefs. To gain a specific operational capability demands an operational concept on how to achieve the capability. What do I mean by an operational concept? It is like the architecture of a building. The operational capability is the building; but there must be an architecture for that building. In what way are we to achieve the capability set forth? Operational concepts define tactics. They also define the equipment and systems with which major force elements—such as F-16 squadrons—must be equipped in order to attain the capability.

Now, having said all that, you can recite from the top down very easily and very simply. There are national security objectives. National security objectives derive national strategies. There is a military dimension of the national strategy called the national military strategy or simply the military strategy. Military strategies define campaigns. Campaigns define the capabilities that you require. Capabilities demand operational concepts to achieve them. The operational concepts define the hardware.

So there is an audit trail all the way from national security objectives down to hardware. You can even recite from the bottom up. For example, take a piece of equipment for an F-6 squadron, the LANTIRN pod. The LANTIRN pod is part of the equipment for the F-16 that has been defined by the operational concept to interdict Soviet echelon forces in Central Europe, to provide the capability along with other capabilities that underwrite our strategies to achieve our objectives in that region.

NECESSARY ASPECTS OF FRAMEWORK

Now, some remarks as to the important aspects of this framework and what has to be put in place before such a framework would work. There are several in number.

One, what is required is an in-depth look at each region. There are really five regions that define our force planning. These are Central Europe, Southwest Asia, Northeast Asia, the Pacific Basin as a whole including Southeast Asia, and then the overshadowing relationship of the Soviet Union and the United States in the presence of strategic nuclear forces.

What is required is an in-depth examination of each one of those regions. The thought process has to be organized by regions. You cannot grasp the correlation between strategy and capability by topics organized by tactical air forces or by maritime forces. For each region there is a set of very specific objectives, strategies, and campaigns. All of those are unique to that region and thus the subject of forces must be subordinated to regions.

This process can work. For example, one of the least understood regions, perhaps, is Southwest Asia. There are two excellent dissertations with regard to this region. One is by the next speaker, Dr. Epstein, in his very good book that has come out recently on Southwest Asia. In that book, he does exactly what I have described. He starts with the objectives, the strategies, the campaigns, the capabilities required, and examines the region in a very systematic and comprehensive way. So there is proof that it can be done.

Another aspect of the framework is the central role that would be played by the Chairman of the JCS. Again I take my cue from the Blue Ribbon Commission. What is required is a very interactive and iterative process to formulate the recommended military strategy for any region and to assess the capability of our forces to achieve that strategy.

The JCS would have to look upwards, of course, to the NSC for objectives and the grand strategy. The JCS would have to look outward to the OMB and the Congress for budget levels. They would also have to look outward to theater commanders for the specifics of campaigns peculiar to that region. And they also have to look downward to the services as to what capabilities can be provided by their major force elements. This requires a very interactive and iterative process. This is quite distinct from a hierarchical process where for example, without the interaction of budget levels, you devise a strategy for a particular region without taking into account the fiscal constraints on the services to equip and train forces.

We should follow the cue of the Blue Ribbon Commission and promote a very interactive and iterative process.

The next key element is the role of the services. If the JCS formulates and recommends the military strategy for a region and defines the specific capabilities required, then this provides a peg on which the services can come to the Congress and state, "Here is our operational concept of how to achieve the specified capability, and here are the equipments necessary to underwrite that concept."

I would like to go back to the analogy of buildings. The currency that we should talk about and focus on should be more operationally oriented and it should be in the currency of buildings. If you talk about pieces of hardware, they are too numerous, and it is difficult to know how they fit into a larger picture. On the other hand, you cannot just talk vaguely about broad missions.

I think, therefore, that the correct currency is about buildings. Buildings together make cities, and a city is a region. That requires, then, that for every specified operational capability the Air Force, the Navy, or the Army must have a well-defined concept of operations as to how to attain the capability. The operational concept in turn defines the equipment.

The last point I would like to make is to reiterate what is set forth in the recommendations of the Blue Ribbon Commission. Specifically that the Chairman of the JCS at the direction of the Secretary of Defense undertake to address the very critical subject of our national military strategy and that they produce an authoritative document that says, "For this region, this is our strategy. These are the campaigns that must be conducted. These are the capabilities required to conduct those campaigns. These are the deficiencies. This is our recommended remedial action."

We have to realize that in doing the above our focus has to be on dynamic campaign analysis. The relationship between capabilities and strategies can never be grasped by comparing static measures of forces or so-called static net assessment as currently practiced.

Thank you.

Chairman CHILES. Thank you, General Kent.

[The prepared statement of General Kent follows:]

Testimony Presented Wednesday, February 18, 1987,
before the Budget Committee of the
United States Senate

by

Lieutenant General Glenn A. Kent, USAF (Ret.)
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A FRAMEWORK FOR PLANNING FOR "NATIONAL MILITARY STRATEGY" [1]

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[1] The views and conclusions expressed are those of the author and do not necessarily represent those of The RAND Corporation or any of the agencies sponsoring its research.

A FRAMEWORK FOR PLANNING FOR "NATIONAL MILITARY STRATEGY"

Introduction

The subject of "defense planning" has come squarely to the forefront. There is an increasing disquiet of the lack of a clear articulation as to the coherence among objectives, military strategies, capabilities, and line items in budgets.

Members of Congress and military analysts are growing increasingly critical of the seeming absence of a logical and persuasive framework that relates larger defense budgets to increased security for this nation. They are also concerned that programs for systems and equipment are proliferating and that these programs are too often advocated on an individual basis without adequate elaboration as to their role in achieving the operational capabilities required to support our military strategies.

What is needed is a more systematic framework to demonstrate the coherence and connective tissue from national security objectives all the way down to the procurement of individual pieces of hardware.

Adhering to a systematic overall framework would provide a much better means of assessing and demonstrating this coherence. The elements of such a framework already exist; they appear as topics in documents relating to defense planning. However, as currently practiced, these elements are not laced together as systematically and coherently as they should be and can be.

The construct to be presented in this paper was developed on the firm belief that perceptive discourse on complex problems is greatly enhanced by a common, simple, rigorous framework and vernacular to which all participants adhere and that without a systematic framework any discourse is apt to be *topical* and lack the discipline required to demonstrate the correlation among the various elements.

The framework to be proposed will build on the recommendations of the President's Blue Ribbon Commission on how to improve the process for planning *national military strategy* as set forth in Chapter One of the final report. The Commission recommends on page 20 of that report that:

> "The Secretary of Defense, following his review and analysis of the Chairman's recommendations, should provide to the President: The Secretary's recommended national military strategy and its corresponding five-year defense budget level, consistent with the President's policy and fiscal guidance."

This paper elaborates on the broad and complex matter described as "National Military Strategy" in the report by the President's Blue Ribbon Commission.

The Anatomy of Planning our National Military Strategy

To promote an easier discourse, the anatomy of the elements surrounding national military strategy will be portrayed in schematic form. The framework for defense planning can be described as involving five major categories of activity that typically take place in a specific organizational setting.

The first major element of the framework is a statement of *National Security Objectives* and *National Strategies*. Our national security objectives define what is necessary to preserve the basic security of the United States. During these decades, these objectives are driven by the aspirations of the leaders of the Soviet Union that threaten our national interests and the worldwide environment created by their ability to pursue these aspirations. Our most demanding security objectives react to the critical regions on the periphery of the USSR: Western Europe, Southwest Asia, Northeast Asia, and to the overshadowing threat of attack by Soviet strategic nuclear forces against the homelands of the United States and our allies. The protection of our interests in the Americas, the Pacific Basin as a whole, and the Continent of Africa also mandate major security objectives and national strategies for these regions.

From a statement of objectives for each region follows a statement as to the *Broad National Strategies* to be pursued to achieve the stated objectives. These broad strategies reflect the art and science of employing, in peace and war, our nation's power to achieve the stated goals. These strategies include political, economic, psychological, and military dimensions or components. There are occasionally changes in these national objectives and strategies. However, these changes are generally in emphasis or priority and our broad strategies remain basically the same for years or decades. The National Security Council, at the direction of the President and in concert with the Congress, define and announce these national security objectives and strategies.

The second major element of the framework is a definition of the military component of the broad strategy, (the *national military strategy* or simply the *military strategy*). Then follows an assessment of whether our *Overall Military Capability* is adequate to underwrite the recommended *military strategy*. A coherence between means and ends demands that for each region there be an explicit statement as to the *Specific Operational Capabilities expected* from the various major force elements (army battalions, Tac Air squadrons, Trident squadrons, etc.) and whether the synergistic sum of the expected *specific operational capabilities* provides an *Overall Military Capability* that underwrites the military campaigns defined by strategy.

Obviously, to have meaning, the process described above must be carried on within the bounds of the resources expected to be available. This means that the specific capabilities expected (current and future) from each major force element for a particular region must have complete coherence with the realities of the finances to be provided. Thus, the key phrase in the sentence above is "expected capabilities"; i.e., what capabilities are "expected" taking into account the fiscal constraints that have been accepted or at least imposed.

By the recommendation of the Blue Ribbon Commission, the definition of the recommended military strategy and the assessment of the correlation between strategy and capability is accomplished by the Chairman of the Joint Chiefs of Staff (and elements of the Office of the Secretary of Defense) at the direction of the Secretary of Defense.

The third major element of the framework is characterized by the term *Concepts of Operations*. A concept of operations is the architecture as to how a specific operational capability is to be attained. The concept typically has three major parts: (1) a statement as to what specific operational capability is to be attained (e.g., what enemy unit is to be destroyed or friendly unit moved); (2) in what region, campaign, and environment; and (3) with what major force element, e.g., armored and mechanized divisions or battalions, F-16 squadrons, carrier task groups, or airlift wings.

The concept of operations identifies the tactics, supporting units systems, equipment, weapons, and munitions to be employed by the major force element to achieve the stated specific operational capability. Service headquarters (with direct assistance from Service Operational Commands and Theater Commands) have the responsibility to formulate the concept of operations for each specified operational capability.

The fourth major element of the framework involves *Service Acquisition Commands* and *Service Operational Commands*.

Acquisition commands undertake programs to procure systems, equipment, weapons and munitions necessary to accomplish the various functions defined in the concept of operations. Service operational commands organize, equip, and train units according to the tactics set forth in the agreed concepts of operations.

The last, and fifth major element, is the employment of forces. Theater Commands develop operational plans to achieve military objectives, conduct training exercises and, at Presidential direction, conduct campaigns defined by the military strategy for that region. They also have a critical input to OSD/JCS as to assessments of the correlation between objectives, strategies, and overall capabilities. In addition, theater commands, along with service operational commands, assist in formulating concepts of operations.

Features of the Framework Described Above

The framework is coherent from top-to-bottom and bottom-to-top. There is also a vernacular that is consistent with that framework. With this framework and vernacular we can articulate from top-to-bottom: *National security objectives* for a particular region are achieved by providing an *overall capability* to underwrite the *broad national strategy* for that region. The *overall military capability* provides the means to conduct campaigns defined by our military strategy and is provided by the synergistic sum of the *specific operational capabilities* provided by various *major force elements*. A specific operational capability is attained by organizing, equipping, and training designated military units according to an agreed-to *concept of operations*. The concept of operations, in turn, identifies the systems, equipment, weapons, and munitions to be procured.

In short, threats to security drive objectives, objectives mandate strategy, strategy defines campaigns, campaigns require capability, capability demands concepts, concepts define hardware.

On the other hand, there is an audit trail from the bottom to the top. A specific item of hardware (like a LANTIRN pod) is being developed to equip F-16s according to an agreed *concept of operations* to attain the *specified capability* to interdict Soviet second-echelon divisions on the Central Front. The specific operational capability provided by these F-16 squadrons, in concert with specified capabilities by other force elements, provides an *overall military capability* to conduct campaigns defined by the *military strategy* of a stalwart forward defense on the Central Front with conventional weapons. This *military strategy*, along with other dimensions of our *broad strategy* achieves our *national security objective* for that region--"to prevent Soviet domination of our European allies and to deter overt Soviet aggression against them."

The key to understanding the coherence among objectives, strategies, and capabilities is to develop and provide an in-depth examination for each critical region or theater. For each region there should be a comprehensive statement that:

- announces, based on NSC guidance, the national security objectives and broad strategy for that region;
- defines the recommended military strategy;
- delineates the specific operational capability expected (now and in the future) by the various major force elements relevant to that region;
- describes how the specific capabilities operate in concert to conduct the campaigns defined by the stated military strategy.

- assesses the likelihood and risk (now and in the future) of success in the conduct of these campaigns.
- assesses the risk that the national security objective for that region will be achieved if the military strategy is, indeed, underwritten; (Even though this statement of risk is properly the purview of the National Security Council (other components of national strategy are involved), such a statement is appropriate to include in the statement by the Secretary of Defense.)
- identifies major deficiencies and recommended remedial action.

The Iterative and Interactive Role by the JCS

A significant feature of the above framework is the concept that the process having to do with planning *national military strategy* is to be a completely iterative and interactive process to be orchestrated by the Chairman of the Joint Chiefs of Staff and elements of the Office of the Secretary of Defense--simply described from now on as "OSD/JCS." This is distinct from a more hierarchial process where the output from one level places a seemingly fixed "requirement" on the next level. A hierarchial process, of course, can have "feedback loops." However, such a process can be too cumbersome when there are many players and many pieces to fit together. After considerable iteration and interaction, we should be able to articulate from the top. That is, after taking all matters into account, there should be a comprehensive statement that is quite explicit for each region:

- These are the national security objectives for this region.
- This is the recommended military strategy.
- These are the specific capabilities we expect from major force elements.
- This is how the major force elements operate in concert to conduct campaigns to underwrite the recommended military strategy.

- This is the assessment of risk.
- These are the deficiencies and recommended remedial actions.

Matching Capabilities and Strategy

The framework proposed in this paper differs importantly from current practice on the approach to match capabilities with strategy. By the proposed framework, the correlation between strategy and capability for each region is to be made on the basis of whether the expected operational capabilities are adequate to successfully conduct the campaigns defined by the stated military strategy for that region. This is in sharp contrast to comparisons of overall budget levels and of overall static measures of forces (numbers of tanks versus numbers of tanks, aircraft versus aircraft, and ships versus ships).

Static measures of forces can be used to gain insights on global and regional balances of power. However, to determine the correlation between strategy and capabilities requires a detailed analysis of the prospects of our forces being able to conduct the campaign(s) defined by the stated military strategy--in the vernacular, *campaign analysis*. Static measures of the balance of power miss the mark since to support a stated strategy does not necessarily require symmetrical or equal forces. *Dynamic campaign analysis* is quite different than *net assessment*, at least as currently practiced.

The Audit Trail to Hardware

Another feature unique to the proposed framework is a much clearer audit trail and connective tissue between (and among) line items for hardware up through capabilities and strategies and finally to objectives. The key to this coherence is an explicit delineation in the report by the Secretary of Defense to the Congress as to the specific operational capabilities expected from each major force element to successfully conduct the campaigns defined by the military strategy for each critical region.

The statement as to the specific operational capabilities expected from particular force elements sets the stage for each Service to describe a concept of operations to attain each specified capability when they subsequently appear before Congress. To maintain an audit trail there must be a strict one for one correspondence. For each specific capability expected from a particular force element there should be a corresponding concept of operations as to how the capability is to be attained. Each concept of operations would, in turn, describe the systems, equipment, weapons, and munitions that must be provided to underwrite the concept. The statement by the Secretary of Defense as to the specific capabilities expected from major force elements provides the "peg" and connective tissue on which Services attach concepts of operations. An agreed-to concept of operations provides the "peg" on which to hook the procurement of systems, equipment, weapons, and munitions.

For example, the report to the Congress could state that to provide an overall capability for a stalwart forward defense in NATO, certain F-16 squadrons are counted on to deal a decisive attack on Soviet second echelon divisions attempting to move from forward assembly areas to exploit potential breakthroughs at the front. This provides the context in which to examine line items such as "LANTIRN pods." That is, the concept of operations to attain the specified capability has identified the LANTIRN pod as essential to accomplish the critical function of "engagement"--a function inherent in any concept of operations to interdict Soviet forces. The integration provided by the concept of operations and the one-to-one correspondence to an already specified capability, provides an obvious peg in a larger framework on which to hang the procurement of this particular system or piece of equipment.

The Currency of Buildings

A specific operational capability can be thought of as a building. The concept of operations is the architecture. A decision to build a particular building according to an agreed-to architecture defines the ordering of bricks, mortar, plumbing, and electrical systems. A decision to attain a specific operational capability according to a well-defined concept of operations, defines the ordering of systems, equipment, weapons, munitions, and training.

The pegs on which to hook budget line items for systems and equipment cannot be too large. A statement that a LANTIRN pod is being procured to provide a forward defense in Europe lacks connective tissue. On the other hand, is is not useful to advocate the LANTIRN pod on an individual basis, i.e., that this particular piece of hardware is being procured because a "requirement" has been validated by some official body. The more appropriate currency for discourse between the DoD and Congress is on the *buildings to be built* (the specific operational capabilities to be attained) and the corresponding *architecture* (the concept of operations). The less appropriate currency is budget levels, line items, and items of hardware.

Will the Framework Really Work?

It is one thing to describe a framework. It is quite another matter to make it work in actual practice. The key question to be answered is "Will there be an important contribution to a common understanding of defense planning if the annual report by the Secretary of Defense on "National Military Strategy" is organized according to the proposed framework?" I think the answer is a clear "yes."

The framework proposed in this paper was described in a RAND Note in 1983. At that time, a researcher at RAND undertook to develop a rather comprehensive statement, according to the framework described above, for one of the critical regions--Southwest Asia.[1] This effort, conducted under Project AIR FORCE, understandably focused on the specific operational capabilities to be provided by major force elements of the Air Force to conduct the campaigns defined by the military strategy for that region. Even with this somewhat narrow focus, this effort demonstrates the feasibility and utility of a comprehensive statement that examines a particular region in detail and attempts to demonstrate, through campaign analysis, the correlation among security objectives, military strategy, and military capabilities.

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[1] See Christopher J. Bowie, *Concepts of Operations and USAF Planning for Southwest Asia*, R-3125-AF, The RAND Corporation, September 1984.

Concluding Remarks

Providing the Congress a comprehensive statement organized according to the above framework and logic will not be a universal panacea. However, it can represent an important first step in gaining some coherent overall perspective on the planning for the military dimension of our national strategy, and the correlation between military strategy and capabilities for each region. Also, the framework (through the connective tissue provided by the *concepts of operations*) should demonstrate how the procurement of individual systems and equipment fit into the larger picture. Such a construct also sharpens the requirement for a more systematic examination of alternative means (competing force elements) of achieving the required overall capability to conduct the campaign(s) defined by the military strategy for a particular theater. Such a construct also provides the context for more focused analyses on how to attain a specific operational capability more efficiently within a particular force element.

Recommendation

The recommended action is simple and straightforward. The annual report by the Secretary of Defense should devote a major section to *National Military Strategy* organized according to the framework set forth above.

Specifically, a major chapter should be devoted to a *comprehensive* statement for each region. This would be preceded by an introductory overview of the overall world situation followed by a summary view of how we stand. Having provided a comprehensive view in Part I, *topical* matters can then be addressed in Part II with more relevance and perception.

FUNCTIONS THAT SURROUND THE PROCESS FOR PLANNING NATIONAL MILITARY STRATEGY

(In Schematic Form)

Announce o National Security Objectives o National Broad Strategies	NSC
o Recommend the National Military Strategy for each critical region. o Define campaigns and the operational capability required of major force elements.	OSD/JCS
o Formulate Concepts of Operations to attain specified operational capabilities.	Service Headquarters
o Procure systems and equipment and organize, equip, and train military units to attain specified capability according to agreed Concept of Operations.	Service Acquisition Commands and Operational Commands
o Develop operational plans. o Conduct campaigns. o Provide inputs to processes above.	Theater Commands

o In collaboration with the Congress.

Chairman CHILES. Dr. Epstein?

STATEMENT OF DR. JOSHUA EPSTEIN, THE BROOKINGS INSTITUTION, WASHINGTON, DC

Dr. EPSTEIN. Thank you, Mr. Chairman. It is an honor to testify this morning on the defense budget and on the central question of how to measure defense capability.

As you note in your welcoming remarks, real defense growth is a poor surrogate for real defense capability. And the reason, of course, is that real defense spending is an input; real defense capability is an output. The first is not and cannot be a measure of the second.

STEPS IN ATTACK ON DEFENSE PROBLEM

It seems to me that a rational attack on the overall defense problem involves, really, four steps, and let me talk about them very briefly.

The first step is to elaborate the basic global commitments for which one's forces are designed. In macro-economic or large-scale budgeting terms, these are: the conventional defense of Western Europe, the Persian Gulf, Korea, and the air and sea lanes to these theaters of war. Over-arching these big conventional contingencies is the requirement to deter nuclear attack on the United States and its allies and to terminate nuclear exchanges with minimal damage if deterrence fails.

These are the basic planning contingencies. They account for the bulk of our spending.

The second step is to assess the forces' performance in executing these global missions. Now, a close accounting of each side's pre-battle forces—tanks, artillery, airplanes—is obviously necessary to any such assessment. But even when conducted even-handedly—a rare enough occurrence—such accounting alone is far from sufficient. Like spending, these peacetime military inventories are just inputs to combat. But we are interested in outputs, performance in executing these core missions. Soldiers, analysts and students of history have long recognized that military outcomes depend on dynamic and operational factors such as terrain, tactics, logistics, combat technology and troop skill, none of which are or can be reflected in the raw bean counts that perennially dominate this debate.

Using analytical methods that go beyond bean counting, it is possible to capture the dynamic interaction of warfare's dominant operational factors and bound in a conservative way the forces' performance in executing these primary missions.

What General Kent calls "dynamic campaign analysis" does allow us to relate inputs to outputs and therefore to identify deficiencies and waste.

Where there are deficiencies—and this is the third step—alternative remedies should be explicitly set forth and compared in terms of cost and effectiveness. Now, I am talking about alternatives with a capital "A", like the substitution of land-based air power for carrier-based air power, or spending more on land forces rather than more on aircraft carriers.

It may well be that shortfalls in one mission area can be remedied without additional defense spending if moneys are reallocated from overfunded or inefficient programs.

Finally, one selects from the set of feasible approaches those that are the least costly.

So in summary, the logical structure of this problem is quite straight-forward. One goes through each of the core missions for which the forces are designed, nuclear deterrence and conventional defense of Europe, the Gulf, Korea, and the global lines of communication. Using dynamic methods, one tries to assess the forces' performance in executing these core missions and, based on those campaign analyses, one cuts what is not needed and tries to meet needs in the most efficient way.

TROUBLESOME FEATURES OF REAGAN BUILDUP

When this contingency-based assessment is conducted rigorously, six troublesome features of the Reagan administration's defense build-up become evident.

First, an exaggerated assessment of Soviet military power, one based largely on static and oversimplified measures of military strength.

Second, an under-assessment of United States and Allied efforts which, combined, have outstripped those of the Soviets and their allies for the last 20 years.

Third, the adoption of strategies that, if feasible at all, are inefficient in accomplishing basic military tasks and that elevate needlessly the risk of escalation—and I am thinking of the maritime strategy first and foremost.

Fourth, excessive growth rates in programs of dubious urgency—for example, the enhancement of deterrence through strategic defenses.

Fifth, wasteful redundancies, such as in the bomber-cruise missile leg of the Strategic Triad.

And finally, bad priorities, giving more money to air-to-air combat and letting close air support languish, for example.

I think it is possible to have real growth in defense capability without real growth in defense spending, if these shortcomings are rectified and spending is made more efficient.

My own net assessment and specific budgetary recommendations are set forth in my Brookings monograph, "The 1988 Defense Budget" which, with your consent, Mr. Chairman, I will submit for the record.

Chairman CHILES. We will accept it.[1]

Dr. EPSTEIN. Thank you, Senator.

Unfortunately, the logical structure of the defense planning problem is obscured by the defense budgeting process and by the defense budget documents themselves, neither of which are broken down by contingency. Contingency-based budgeting is long overdue. It would permit the Congress and would encourage the Pentagon, to compare means and ends more systematically and to satisfy our global commitments more efficiently.

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[1] See p. 272.

Thank you.

Chairman CHILES. Thank you.

Admiral Zumwalt?

STATEMENT OF ADM. ELMO R. ZUMWALT, JR., USN (RETIRED), FORMER CHIEF OF NAVAL OPERATIONS AND MEMBER OF JOINT CHIEFS OF STAFF

Admiral ZUMWALT. Mr. Chairman and distinguished members of the committee, I am pleased to be here to respond to the committee request that I provide my "views on national security and the budget request for the Department of Defense."

I have been involved in national security issues for 48 years. Forgive me then if I begin this statement with a bit of perspective from those years.

U.S. DEMOBILIZATION EMBOLDENS SOVIETS

The United States ended World War II in a position of overwhelming military superiority. We had a monopoly on strategic nuclear weapons, unquestioned control of the oceans, and we had air and land forces equal or superior to those of the Soviet Union.

We demobilized. We gave up superiority of land forces. During the era of Secretary of Defense Louis Johnson, the readiness of our air and naval forces declined dangerously.

This was perceived by Stalin and in part contributed to his evaluation that he could authorize and support North Korea's invasion of the South in 1950 without fear of U.S. response.

Our remarkable performance in the Korean War came more easily than it might have because we were able to draw on and recall to active service ships, aircraft, tanks, veterans and so forth, to drive the invaders out of South Korea.

After the Korean War, we avoided for a while the catastrophic reductions that occurred after World War II.

Expenditures for defense over the ensuing years waxed and wanted relatively, but there was a generally downward progression from 12 percent of our GNP and 50 percent of Federal outlay for defense in the early Fifties to less than 5 percent of the GNP and less than 25 percent of Federal outlays in the Carter era.

The Reagan administration has improved these percentages modestly. They will be at 6 percent and 28 percent, respectively in the proposed 1988-89 budgets.

Throughout all those years, the Soviet Union spent greater fractions of their GNP for military power. As their GNP increased and as our defense fraction decreased, they began to outspend us for military power.

For the first half of the post-World War II period, the U.S. retained the clear superiority with which to deter and win wars. Our strategic nuclear capability remains superior to that of the U.S.S.R. Our tactical nuclear superiority in Europe, our maritime capability to reinforce and supply European allies, and the emergency of NATO forces provided a secure umbrella for our major allies.

U.S. POWER BACKS RUSSIANS DOWN IN CUBA

On the staff of a member of the Executive Committee of the NSC during the Cuban Missile Crisis, I witnessed this calculus of forces cause the Soviet leadership to withdraw its missiles from Cuba, foregoing its objective of doubling the megatonnage and halving the warning time of their strategic forces.

By the time I became a member of the JCS, 8 years later in 1970, the Soviet Union was in the process of achieving the same result by its construction of strategic forces in the homeland and for deployment on the oceans.

In order to persuade the Soviets to accept a limit in their strategic forces in the 1972 Interim Executive Agreement, President Nixon had to grant them a 35-percent advantage in both ICBMs and SLBMs and a huge advantage in megatonnage. The JCS were clear that the deal only made sense if the Soviets were not permitted to cheat and if the Congress funded the intelligence, R&D, and strategic procurement programs necessary to get a better deal in SALT II. This did not come to pass. As a result, the Soviet strategic advantage increased.

In SALT II, in my judgment, we granted the Soviet Union a twofold advantage in throw-weight and area destruction capability, a threefold advantage in megatonnage, and a fivefold advantage in prompt, hard target kill capability.

Also, by the time I became a member of the JCS, the allies were losing their tactical nuclear weapon advantage in Europe and the United States was losing its air and naval capability to save Europe in a conventional war.

I reported to President Nixon and the Congressional committees that the United States had fallen to a 35-percent probability of victory in a conventional naval war with the U.S.S.R. I heard my Air Force counterpart inform the President that we had fallen to less than a 50-percent probability of victory in an air war in Europe. I heard my Army counterpart inform the President that NATO's ground forces could not withstand Warsaw Pact forces.

SOVIETS BACK U.S. DOWN IN YOM KIPPUR WAR

This decline in power was apparent, in fact, at the time that the Soviet Union delivered a virtual ultimatum to the U.S. in the Yom Kippur War. The JCS were of the view that the U.S. lacked the capability to withstand Soviet forces at that time.

In my judgment the military balance worsened in the Carter era as the stocks of munitions and spare parts and personnel readiness and morale reached new lows and equipment overhaul backlogs reached new highs.

It is in the light of these developments that the defense programs of the Reagan era must be examined.

With regard to the net assessment today, let me say that since leaving the JCS 13 years ago, I have had the opportunity to keep current on national security issues through frequent exchanges with members of the Executive Branch and the Congress, through participation in the analytical work of the Defense Panel of the Rockefeller Commission on Critical Choices and of the Committee on the Present Danger.

I evaluate our situation today as follows.

ASSESSMENT OF UNITED STATES/SOVIET FORCES

With regard to the strategic balance, the strategic nuclear program of the Reagan administration has slowed the rate at which the U.S.S.R. is improving its margin of superiority, but the absolute margin of that superiority is greater today than ever before. This is in part the result of greater expenditures by the Soviet Union and in part the result of a successful Soviet violation of arms control agreements.

Soviet strategic defenses have improved more than ours: in the continual hardening of their command and central facilities; in their defenses against aircraft and cruise missiles, and in their ABM system with a capability for nationwide coverage. They have outpaced us in the hardening and mobility of their ICBM forces. We retain advantages in submarine quieting and intercontinental bombers, but they have appreciably closed the gap.

Accordingly, although our deterrent is better than it would have been without the Reagan administration strategic programs, in the net, it is less secure. In my judgment, the funds requested for MX, D-5, B-1, ATB, C3 initiatives and Midgetmen are desperately needed to strengthen that deterrence.

TACTICAL NUCLEAR

With regard to the tactical nuclear balance, the tactical nuclear balance in Europe has continued similarly to deteriorate. The Carter/Reagan program to deploy GLCM's and Pershing II's has reduced the rate of increasing Soviet advantage but overall Soviet superiority has increased as the Soviet Union has deployed its theatre nuclear forces in greater numbers. As a result, the U.S.S.R. has great superiority in intermediate nuclear forces and at least parity in battlefield nuclear weapons.

CONVENTIONAL MILITARY

With regard to the conventional military balance in Europe, at the same time that strategic and tactical nuclear deterrents to conventional military invasion in Europe have deteriorated, our conventional military disadvantages there have not been overcome. Soviet air and ground forces in Europe have always outnumbered NATO's and in the last 15 to 20 years, our qualitative advantages have been reduced.

CHEMICAL WEAPONS

The U.S.S.R. has a virtual monopoly on chemical weapons. It has a vast advantage in biological weapons. The United States has no effective counter to either. The Warsaw Pact leads NATO in virtually every category of ground equipment.

READINESS AND SUSTAINABILITY

The good news is that the readiness and sustainability of U.S. forces has been greatly improved. But the NATO ground defense perimeter remains weak because our allies have not improved their sustainability.

AIR WAR

In the air war, Soviet numerical advantages in both offense and defense are somewhat countered by NATO's qualitative edge in tactical aviation. But this counter has been reduced by the pace of Soviet modernization of its tactical air.

CONVENTIONAL WAR

On balance, I believe that in a conventional battle in Europe, NATO would have a 45- to 50-percent chance of holding, up from the 30 percent when I was a member of the JCS. Obviously, this is still not good enough. The expenditures proposed by the President to improve the situation are only marginally adequate, in my judgment, and should not be reduced.

EAST ASIA

With regard to the balance in East Asia, Soviet infrastructure to and in Siberia has been greatly improved. Their forces there have been increased in number and modernized. They have fortified the Soviet-held Japanese islands. North Korea remains aggressive in motivation and well-armed. The Soviets have deployed air and naval forces into the superb facilities that we built at Danang and Camranh Bay, greatly increasing their reach in Southeast Asia.

The United States has now the risk that the Philippine bases will not be available in the future. Loss of access to these bases would require major increases in naval forces to compensate even partially.

The PRC continues to be of advantage to the United States interests by tying up large Soviet land forces and by its threat to punish Vietnam in the event Vietnam should invade Thailand. Japan's willingness to exceed one percent of its GNP for defense will pay off in time.

The improvement in U.S. naval forces has tipped the balance in East Asia slightly in our favor. But the need to deploy Pacific forces to the Atlantic in war or the loss of Philippine bases could tip the balance against us.

SOUTH ASIA

With regard to the balance in South Asia, Soviet forces in Afghanistan have brought United States naval forces in the Indian Ocean under greater threat. Soviet forces in the People's Democratic Republic of Yemen and in Ethiopia, together with those located in—there is a typo here in the text—in Afghanistan and their homeland, have encircled the oil pools of the area.

This makes it imperative that the pre-positioned logistics and strategic mobility forces be fully funded.

CENTRAL AMERICA

With regard to the balance in Central America and Cuba, the United States forces are clearly adequate to deal with Soviet forces in Central America and Cuba, but Soviet long-term strategy is to work around this disadvantage. In my judgment, they intend to continue to use Nicaragua as a base for the subversion of Central

America using Soviet equipment and Cuban advisers. They can thus ultimately control the Panama Canal. In time, they can develop the military infrastructure and forces to be able to separate the two Americas in war.

They aspire, I believe, to use Central America later to subvert Mexico, to dictate the economic and political terms for which the United States can get Mexican oil, to use the Mexican border to destabilize the United States—forcing, they hope, the United States to withdraw forces from Europe to defend our border—leaving Europe to be neutralized.

Obviously, the Soviet strategy has a long way to go. But if we do not keep the Contras active, we should expect to have to make significant increases in our conventional forces in the years ahead to counter Soviet successes here while meeting worldwide commitments.

MARITIME BALANCE

With regard to the maritime balance, one area in which the U.S. capability to deal with the Soviet threat has improved is at sea. And if the 1988–89 programmed naval forces are funded, the United States will, in my judgment, have come from a 35-percent to a 55-percent probability of being able to keep the vital sea lanes open in a conventional war with the U.S.S.R. I have a paper that goes into more detail on that that I will not read.[1]

PROJECTION FORCES

With regard to projection forces, Soviet capability to project power into Eurasia and the Middle East has improved markedly in recent years. Its capability to do so in Africa south of the Sahara and in the Western Hemisphere has improved, but United States superiority in carrier air, amphibious and underway replenishment forces gives the United States significant advantages in those areas more remote from the U.S.S.R.

Why haven't the immense defense expenditures of the Reagan years accomplished more?

Clearly, much has been accomplished. Our forces have the highest degree of readiness and sustainability that they have had in peacetime in my lifetime. And our military power in absolute terms is greater than ever before.

But the Soviet Union continues to outspend us and therefore to grow in capability at a faster rate. My view is that we cannot hope to match the U.S.S.R. with adequate forces nor overcome our areas of relative weakness without increasing our defense expenditures to at least 8 percent of our GNP with significant increases in allied expenditures as well. I believe such expenditures are economically feasible.

The 1988–89 defense budgets bring us to a crossroads. Will Congressional reductions return the United States to the historically general downward trend in the fractions of GNP and Federal outlays for defense? Or, will Congress have the foresight and political courage to begin now the long-term increased expenditures necessary to deal with a relentlessly arming adversary whose system is dedicated to the achievement of political, economic and military hegemony over the globe?

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[1] See p. 232.

Thank you, Mr. Chairman.

Chairman CHILES. Thank you, Admiral Zumwalt.

[The following was supplied for the record by Admiral Zumwalt:]

MARITIME BALANCE

Our principal adversary is a powerful continental power, prone to aggression and encroachment against our allies and interests abroad. No strategic imperative for control of the seas is placed on the Soviets, yet they continue to amass extraordinary naval and power projection capabilities. Capabilities that threaten and challenge the West. I have watched the Soviet Navy develop for several decades and have always been impressed by the sheer size of that force. Its submarine force alone is double the size of ours and their inventory of mines far surpasses that of the entire NATO Alliance. I am now increasingly impressed by the growing sophistication and quality of Soviet naval forces. For example, their submarines are getting quieter and more capable, posing a serious danger to our national military strategy if allowed the freedom to conduct global offensive operations.

Given our strategic imperative to maintain maritime superiority and the existence of an increasingly capable and globally-positioned naval adversary, I reach several conclusions about the role of the US Navy in overall stategy. First, because the Navy will continue to remain the political leadership's force of choice to respond to international crises, we must ensure that naval forces maintain at least their current level of operational readiness, steadily built up in recent years. Ready naval forces exemplify a delicate balance of awesome power, responsiveness, and utility unencumbered by the logistic or political constraints that frustrate the employment of other forces for political leverage.

Second, the Navy must be sized to ensure control of the seas where they are vital to our own and allied interests. In the absence of sufficient sea control and power projection forces, some allies critical to our alliance structure and some sea lanes critical to our country's survival would, of necessity, go unprotected in a conflict with the Soviet Union. To preclude such a dangerous result, I believe that the often validated and Congressionally supported goal of 600 ships and 15 carrier battle groups for our Navy provides a minimum force level with acceptable risk.

Third, and finally, I feel that our fleet should be postured as far forward as is politically and militarily useful in peacetime and in war. A forward offensive strategy yields several desirable results. It sends a message to our friends that we will cede no territory nor vital sea access by default. More importantly, it sends a series of similar impressive messages to the Soviets. In response, they are forced on the defensive in all maritime theaters, and pressured to conserve power projection forces--sufficient in their calculations to protect vital interests on their flanks--that, in the absence of a forward maritime threat, would be released to threaten Weatern alliance vulnerabilities. They must withhold reserves that might otherwise be used on the NATO Central Front. And, they must cede effective control of the oceans, ensuring our ability to mobilize the industrial reserve of the West to sustain a global, protracted war. In sum, a forward naval strategy is a most effective conventional deterrent. A deterrent, in particular, to Soviet warplanners' preference to conduct a short, one theater war.

Maritime superiority is a necessary condition for the execution of a national security strategy which relies upon deterrence, forward defense and alliance solidarity. I strongly support the conclusions of the President's document on national strategy which stresses the critical role of maritime forces in the implementation of overall U.S. policy. I would emphasize that, in my view, the full effects of maritime power necessary for superiority can be generated only when the capabilities of our Navy are fully combined with the unique capabilities and contributions of the other services and our critical allies. More needs to be done to ensure that combination in time of war.

Chairman **Chiles**. Senator Exon, it does not seem possible that you should begin questioning first, based on history, but I am afraid that the facts speak for themselves.

Senator **Exon**. All your rules catch up with you sooner or later, Mr. Chairman. [Laughter.]

Senator **Domenici**. But you are not smoking.

Senator **Exon**. No, but I am about to. [Laughter.]

FISCALLY BANKRUPT DEFENSE POLICY

General, thank you for being here this morning. I listened with great interest to your testimony.

There seems to be some difference of opinion. We had the Secretary of Defense and the Chairman of the Joint Chiefs with us yesterday at Armed Services. It seems to me from both the budget standpoint, where I serve, and also over on the Armed Services Committee, that one of the major problems that we have, gentlemen, regardless of what shape our forces are in or are not in, it is my uninformed opinion—and I have written this to the Secretary of Defense—that looking 2 years from now when the next President of the United States takes over, that next President of the United States is going to inherit a totally, fiscally bankrupt defense policy. Now, that may be an overstatement, but I do not think it is.

I think we have got so many programs coming down the pipe—and I suspect that you know of most of them—that I do not see how we are going to begin to pay for the military build-up that we have, whether that is sufficient or whether that is not sufficient.

We had in front of the Armed Services Committee 10 days ago, Rudy Penner, and he substantiated exactly what I have just said—that there is no way we are going to pay for all of these things coming down the pipe, and what we have been doing over the last few years, while we have made some improvements—and we all agree with that—we have so many programs going in so many different directions—and this is an overstatement—that in 3 to 5 years, if we would suddenly come upon the ultimate weapon that mankind has been seeking from the beginning, that would establish us as the military leader of not the free world, but the world, we just would not be able to afford to buy it. We have got too many things in the pipe.

I am wondering whether you agree with that philosophy of mine. I must say the obvious question, I guess, is how did we get ourselves into this mess. We got ourselves in this mess, I think, by being extremely long on rhetoric, extremely long on planning, and extremely shortsighted on our whole budgetary scheme and system in the United States, defense and otherwise.

STRETCHING OUT PROGRAMS BIG PROBLEM

I would just like to get your thoughts on what Dr. Penner and others have said to us, that we have been funding this expansive military build-up on paper by each and every year going in and cutting back programs. If you had a long-range program to procure, say, 1,200 tanks in a 5- or 6-year period, and you have stretched that out to an 18- to 22-year period by each and every year, the year you were going to buy 240, you scaled that back because of other budgetary constraints to maybe 80 or 90 or 100. And we are continuing to stretch out every program that we have.

Number one, I think that hurts our overall conventional defense and our nuclear deterrence. I think it also badly fouls up our planning on down the line.

Another way of putting that is that there never has been a weapon system that we cannot find some way to buy, whether we can afford it or not. And we generally do that by stretching out and stretching out and stretching out, to the place where I think we have got that rubber band so stretched out that the next President of the United States, 2 years from now, whoever that is, Democrat or Republican, is facing, I think, a nightmare as far as meeting the national defense interests of the United States.

What do you think about it, in any way you want to respond?

General Kent?

General KENT. There certainly has been a proliferation of systems and great turmoil in the procurement of systems, both in starts and stops and stretchouts. This is to the disbenefit totally of the United States and our security. It is certainly not the way to get the best operational effectiveness out of the money provided the military.

I think one way to rectify that problem is to decide whether to build particular buildings or not. Once you decide to build a particular building, and there is architecture for the building, that mandates the ordering of the bricks and the mortar and the plumbing and the electrical equipment. We are focused too much on the electrical equipment and the plumbing and not the buildings. We ought to organize our discourse between the Congress and the military on the right form and size currency—namely buildings.

For example—and this will reflect my Air Force background—one building is a contract with the Air Force that states that they guarantee that their F-16 units will deal a decisive blow to the Soviet second echelon forces when they attempt to move out of their assembly areas to reinforce potential breakthroughs at the front. That is the contract. There is a corresponding well-defined operational concept of how to achieve that capability that identifies equipment like J-STARS and LANTIRN pods and SKEET munitions and weapons. Once decided we stick to it and build that building to completion and build it on time.

Admiral ZUMWALT. Senator, if I could, I would like to comment on it in this way. I had the thrill when I was a young lieutenant of spending a day with General George Marshall when he was finished with his tenure as Secretary of State and had not yet been Secretary of Defense. And I can remember saying to him when I was a high school student in the late thirties, my perception was that my government was telling me, through the media, that in the event of a war with Japan, we would prevent the invasion of the Philippines.

He said, "You are right."

And I said, "Why didn't we?"

He said, "Lieutenant, you have got to come to understand the difference between your government's declaratory policy and reality." He said our declared policy was that we would prevent the invasion; the reality was that we had absolutely no military capability to do so and always planned to surrender the Philippines and fight our way back if we could.

Now, when I was Chief of Naval Operations and a member of the Joint Chiefs of Staff, and reporting those 35-percent probabilities of victory, we were declaring publicly that we could defend our allies.

Our plan was to remove our forces from the Pacific and let Japan and Korea go down the drain, in a desperate effort to try to save Europe. We could not tell the people that; we would lose allies by saying that.

The Navy build-up in these last years has made it possible for us to begin to plan to fight in both oceans and to protect allies in both oceans. It has made a tremendous difference. And I would defend those expenditures to the fullest and urge that they continue to be made so that we can begin to move our declaratory policy and reality into correlation

[The following addendum to his testimony was subsequently supplied for the record by Admiral Zumwalt:]

ADDENDUM #1

Dr. Epstein's assumption that the U.S. Navy can conduct its essential missions with a twelve carrier force is based on a poor understanding of both national security requirements and naval strategy. Implicit in his argument is that the exclusive purpose of aircraft carriers is to ensure that the sea lines of communication between the U.S. and NATO remain open during war with the Soviets and that this can best be effected by drawing up a naval barrier around them.

The aircraft carrier has proven to be our National Command Authorities' most useful military instrument since the end of World War II in peacetime, crisis, and conflict. Just as the Navy is our nation's "force of choice" in response to most international incidents, the aircraft carrier is the overwhelming platform of choice. Not surprisingly, aircraft carriers maintain the most ambitious peacetime deployment schedules of all our ships. Since we are already operating them at the margin, any reduction in the carrier force will reduce our ability to meet today's forward deployment commitments which provide meaningful reassurance to our allies and deterrence to adversaries of all sizes. Put more bluntly, we may have forgone the opportunity to capture the Achille Lauro hijackers or defaulted on the opportunity to strike a blow against international terrorism in Libya if we were saddled with a twelve carrier force.

The wartime requirement for at least fifteen carriers is well documented by the collective judgment of the Joint Chiefs of Staff and the theater commanders who will employ these forces. They understand that war with Soviets will be global in nature and not just a contest for the North Atlantic. U.S. vital interests in the Pacific, Mediterranean, and Indian Ocean will also require the mobile firepower that only carrier battle groups can provide. Reducing the total carrier force to twelve is tantamount to ceding whole maritime theaters of operations to the Soviets, since several carriers may be in overhaul and the remainder will operate in battle forces composed of 2-4 carriers.

Dr. Epstein's suggestion that we operate our Navy defensively shows a lack of appreciation for the subtleties of war at sea, in which the offense enjoys the economy of force because of the mobility of naval forces and the absence of terrain constraints and concealment positions. Numerous wargames and detailed analyses have built a substantial case that the most efficient and effective defense of sea lanes in a major war results from the use of a measured offense. Such an approach suggests aggressive naval operations aimed at moving the maritime battle as far forward as prudently possible, forcing the Soviets to defend their SSBNs and homeland rather than sending forces to attack SLOCs and threaten our allies. Conversely, fixed defensive positions and gauntlets such as the GIUK gap are increasingly avoidable by highly mobile and quiet submarines, especially when the so-called gap is actually hundreds of miles wide at its narrowest point. Defensive sea control against an unleashed submarine force numbering in excess of 300 would require naval force levels far greater than the entire Western Alliance could muster.

It bears repeating that the NATO Alliance may not win the next war at sea but could undoubtedly lose it if we relinquish control of any of the free world's oceanic lifelines. The expanding nature of the West's "arsenal of democracy" implies that control of Pacific LOCs may be equally crucial to our ability to fight a protracted war in Europe. An effective offensive maritime strategy with its attendant economy of force is therefore the best insurance policy we can buy to safeguard the execution of our national military strategy. The cornerstone of this maritime strategy is a sufficient number of high quality carrier battle groups capable of sea control and power projection throughout the world in support of U.S. national security objectives.

[The following response to Admiral Zumwalt's addendum to his testimony, supra, was subsequently supplied for the record by Dr. Epstein:]

Epstein Response to Zumwalt Addendum #1 May 20, 1987

Admiral Zumwalt begins his addendum by mistakenly attributing to me the view "that the exclusive purpose of aircraft carriers is to ensure that the sea lines of communication between the U.S. and NATO remain open during war with the Soviets." Indeed, if that were my view--and I deny that it is--I would be hard pressed to justify even the twelve carrier fleet I endorse, since defense of the Atlantic sea lanes per se could probably be accomplished with no aircraft carriers whatsoever by relying on land-based tactical aircraft, submarines, mines, patrol aircraft, and convoy escorts.

In fact, in my Brookings monograph, The 1988 Defense Budget, which I have submitted for the record, I explicitly include precisely the Pacific, Mediterranean, and Indian Ocean carrier missions that Admiral Zumwalt suggests I ignore. Even including these missions, however, and accounting for the fact (noted by Admiral Zumwalt) that not all carriers can be kept on station in war, a fleet of 12 carrier battle groups (and four surface action groups) is more than adequate if sea lanes are secured in an efficient, primarily defensive, manner.

Admiral Zumwalt's case for offensive submarine operations seems logically flawed. He asserts that "gauntlets such as the GIUK gap are increasingly avoidable by highly mobile and quiet submarines, especially when the so-called gap is actually hundreds of miles wide at its narrowest point." Surely, the north Norwegian Sea--where the Navy would conduct its offensive campaign--is far wider! More to the point, the very advances in

Soviet submarine quieting which Admiral Zumwalt notes (also in Addendum #2) call into question the feasibility of the offensive submarine operations he advocates. The aim of these subsurface offensives would be to force the Soviets' nuclear-powered attack submarines (SSNs) into a defensive posture from which they could not threaten NATO's sea lines of communication.

But once their strategic ballistic missile submarines (SSBNs) are sufficiently quiet, the Soviets may not feel compelled to withhold those nuclear-powered attack submarines to defend them. The passage north of Soviet SSBNs to the relatively safe shallow waters at the edge of the ice cap could be protected by other, smaller, submarines and airpower. The net result might be that the United States would squander the conventional sea control capabilities of its SSN force in a fruitless effort to attack quiet Soviet SSBNs, while freeing the Soviets' best attack submarines to harass NATO's sea-lanes--exactly the reverse of the strategy's intent!

Assuming their feasibility, moreover, successful attacks on Soviet SSBNs could prove needlessly escalatory. The mere fact that U.S. nuclear weapons had not been used to destroy Soviet strategic weapons (SSBNs) would not make the latter's annihilation any less momentous; Soviet assured destruction capabilities would be degraded. Under such circumstances, the prospect of Soviet escalation might well be raised. If so, American aircraft carriers operating in the vicinity of the Soviet homeland would themselves make attractive targets for Soviet nuclear response.

This raises the question of surface naval offensives against the Soviet homeland using aircraft carriers. First, the Navy has never convincingly argued that such offensive operations would be more effective than defensive ones in protecting sea-lanes. Second, even if one grants the necessity for such attacks, it still does not follow that carriers are a good buy; on a life-cycle cost basis, the aircraft carrier is overwhelmingly dominated by conventional cruise-missile-carrying aircraft. Third, if one insists on these missions, and insists on performing them with carriers, a 15-carrier fleet is not nearly adequate--even assuming, favorably, that nuclear weapons are not in play. Indeed, as I argue in The 1988 Defense Budget, to have even moderate confidence of success in executing, with aircraft carriers, the global offensive (and other) missions contemplated in the Maritime Strategy, the U.S. Navy would need at least a 21-carrier fleet, at ten-year costs exceeding those of the planned 15-carrier fleet by roughly $158 billion.[1] I fail to see in this offensive approach the "economy of force" Admiral Zumwalt claims for it, especially when a 12-carrier fleet, if employed efficiently, is more than adequate to protect the sea lanes in wartime and support U.S. foreign policy objectives in peacetime.

On the contrary, the entire Maritime Strategy represents a massive diversion of scarce resources from the immediate defense of Western Europe into offensive surface and subsurface actions that are inefficient in accomplishing essential naval tasks (such as sea-lane defense) and that could prove escalatory on the generous assumption that they are feasible at all.

These and other points concerning the Maritime Strategy and the 15-carrier, 600-ship navy are fully elaborated in my monograph, The 1988 Defense Budget (Brookings, 1987), which I have included for the record.

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[1] As shown in The 1988 Defense Budget, these numbers rest on assumptions that are very favorable to the U.S. Navy. On perhaps more realistic assumptions, the number of carriers required could be as high as 28.

Senator **Exon**. Dr. Epstein?

Dr. **Epstein**. Let me just inject some facts about the backlog you refer to. I think they are sort of daunting. I agree with what I think is your assessment of a real crunch.

For instance, if budget authority were literally zero for the next 5 years—not zero growth, but literally zero—we would spend $200 billion honoring commitments that have been made.

To give you another measure of the sort of momentum that is built into this process, if it were decided that outlays were to be frozen in real or nominal terms, my current estimate is that budget authority would have to be reduced over the next 5 years by $102 billion for a real outlay freeze and $320 billion for a nominal outlay freeze.

These budget facts, this head of steam, is largely a consequence of the investment decisions that have been made over the last 6 years, and this build-up has largely been investment-intensive.

I do think that we are stronger than we were in 1980, but it has been the rising tide phenomenon, and the rising tide lifted all boats. Now, as the Director of the CBO has said, and I think we all agree, the tide is going out, and high-priority boats may be left on the shore to rot, unless we make the tough choices that have to be made.

DUAL DEVELOPMENT OF MX/MIDGETMAN

Senator **Exon**. Well, let us get down to one tough choice. It seems to me that we fool ourselves all the time. I for one had always supported the MX missile as giving us the accuracy and the throw-weight that we needed. I turned and was violently opposed to it and remained opposed to it when this administration decided that they were going to take—regardless of how good their planning is, Admiral—that MX missile and they were going to put it right back in the Minuteman II and III silos where the missiles are as vulnerable to Soviet attack as they had been for 15 years. I said that makes no sense whatsoever because it defeats the very basis for the creation of the MX in the first instance.

Now, at long last this administration has done, I think, a very constructive thing. They have talked about a rail mobile basing for the MX.

Now I have not changed; I am right where I always was. I am just back onboard, and I am telling them that finally you have got something that might work.

Now, while we are doing that, simultaneously, if you look at next year's budget, you will see that for the next 2 years, this administration has provided very little—compared with other programs—to quickly develop a rail based mode for the MX missile. Instead they have gone $30 to $40 billion to simultaneously develop the Midgetman at the same time.

It seems to me that if we are in the budget constraints that we all seem to think we are in, we ought to make decisions on whether or not it is in the best security interest of the United States to build an MX rail mobile system as it was designed for in the instance and maybe consider dropping the $30 to $40 billion it is going to cost us to build the Midgetman.

Granted, we would be stronger if we had both. What can we afford? What do you gentlemen think of that?

Admiral ZUMWALT. Senator, I think you were correct in your philosophy in the first place. I think the administration was wrong, and I am glad that they now are planning a rail mobile concept.

In my 8 percent of the GNP budget, we would be able to afford to do that without giving up any of the things which I consider critical as well.

MIDGETMAN NEEDED ALSO

Senator EXON. Do you consider the Midgetman critical?

Admiral ZUMWALT. Yes, sir, I do, given the fact that we are faced with a Soviet Union that is still walking away from us with regard to their strategic deployments and which has only begun to get interested in arms control in a stable way as a result of some of the things that the President has initiated.

Senator EXON. But Admiral, you talk like so many people that I talk to. If you are concerned about them walking away from us, then isn't it true that we could save an awful lot of money and maybe stop them from walking away from us if we would take the $30 to $40 billion or a portion of it that we are going to spend on the Midgetman that is not yet developed and build more MX missiles?

The MX-10 warhead missile is a pretty potent weapon, much more potent than the Midgetman—now, there are some gives and takes on these things. But if you want to stop the Soviet Union from walking away from us, wouldn't you agree that the fastest way to stop them and the cheapest way to do it would be to build more MX missiles and put it on a rail mobile system?

Admiral ZUMWALT. Senator, the problem, I think, that any President faces is that there are always groups within Congress that will cut any specific program. And the trouble that a President and a Department of Defense has is to defend programs and to get through enough to have balance.

Clearly, we would all hope that the day will come when we can achieve verifiable arms control agreements that will make it possible to reduce our expenditures in the strategic field. Until that day comes along—and I believe personally it is in the distant future—I think that the expenditure for Midgetman to give us the numbers of targets and MX to give us numbers of warheads is an intelligent combination.

Chairman CHILES. Senator Domenici?

Senator DOMENICI. I am going to be here a while longer, Senator, so I would go ahead and let Senator Grassley go ahead.

Senator GRASSLEY. Thank you.

BUDGET CUTS WOULD SHATTER DEFENSE

Gentlemen, 3 abor 4 years ago this committee was told by Secretary Weinberger that if we were to cut any amount of money from the defense budget that eventually they would have to cancel the MX missile, the B-1 bomber, the F-16, F-15, the M-1 tank and probably even half the Navy. We proceeded not only to cut considerably from what was proposed, but for 2 consecutive years in a row we have frozen the defense budget.

Now, after all that, today, how surprised are each of you after a 2-year freeze that we still have the MX missile and the B-1 bomber and all these other things I mentioned? We even have our entire Navy. We even have the Washington Monument.

Does that surprise you that we have got all that stuff?

Dr. EPSTEIN. Well, I think this in fact bespeaks the problem that the Chairman's opening remarks noted, that we are in a period where large alterations in appropriations seem to have very little effect on the program structure of defense. This, I think, in a sense weakens our control over the whole process. If pricing is so fuzzy that when you hit the brakes the train does not slow down, then you are endangering the passengers.

Senator GRASSLEY. So what materialized after a 2-year budget freeze does not surprise you at all?

Dr. EPSTEIN. I am disturbed by the facts. I am not sure I am surprised.

Senator GRASSLEY. OK.

Admiral Zumwalt?

Admiral ZUMWALT. I guess, Senator, the thing that worries me is that questions of that type do not come at the problem as I think it ought to be confronted. The problem that constantly needs readdressing is the fact that the Soviet Union is outspending us and deploying forces at a greater rate, and has improved its margin of advantage in the strategic nuclear field, in the tactical nuclear field, and in the conventional field. And we need constantly to focus on that if we are going to have a future in which our concept of the world prevails as opposed to the Soviet concept.

[The following addendum to his testimony was subsequently supplied for the record by Admiral Zumwalt:]

ADDENDUM # 2

Dr. Epstein's appraisal of the nuclear strategic situation relies on a model that attempts to reduce deterrence to a simple, static discussion of target coverage. In fact, its effectiveness depends on a wide variety of forces and policies which convince Soviet leadership that their aggression would result in unacceptable costs. To accomplish this, we must produce systems that are survivable, capable, flexible, and discriminative. Although our ability to attack undefended, immobile targets will be improved with the operational deployment of Trident II/D-5, we should not be sanguine that this system alone is the answer to our nuclear deterrence requirements. In assessing the objective of our strategic forces and associated targeting policy, we must consider not what would deter us, but what would deter the Soviets -- whose world view and means of assessing the credibility of our deterrence are substantially different from our own.

Soviet strategic force development reflects a set of objectives that is far more ambitious than our own. I agree with Admiral Crowe that they already have clear superiority in ICBMs and overall megatonnage. They are developing three new ICBMs, which constitute the largest and most destabilizing offensive systems. Their continued deployment of new mobile ICBMs (SS-X-

2A, SS-25), designed to be as large as 25 percent of the future strategic arsenal, significantly reduces the utility of our prompt hard-target kill systems. Their SSBN force is being enhanced by the deployment of the long-range, more accurate SS-N-20, while the Soviets are already developing next generation replacements. These missiles are being placed aboard newer and quieter submarines, making them increasingly difficult to locate and attack. They have developed both sea- and air-launched cruise missiles, posed against a virtually non-existent U.S. air defense system.

They support a massive and unprecedented strategic defense effort, including a wide array of passive and active programs. Their vast network of hardened leadership bunkers and extensive civil defense efforts epitomize their philosophy that nuclear wars can be fought and survived. Their strategic communications are highly redundant and hardened, giving them survivability that U.S. forces must still emulate. Their 100 launcher anti-ballistic missile system, the world's only such strategic defense system, is undergoing a major modernization. They possess the world's only operational anti-satellite system, capable of destroying satellites in low earth orbit.

Their willingness to press every element of the nuclear strategic equation indicates a single-minded goal of developing an effective disarming first strike capability. They understand the many elements in this equation and fully appreciate the political benefits that attach to nuclear superiority. No single element of the U.S. strategic arsenal can thwart this goal. The entire U.S. strategic modernization program -- MX, D-5, B-1, ATB, C^3 initiatives, and small ICBM -- is required to offset the Soviet attempt to gain superiority and to create a more stable strategic relationship. Each of its elements is designed to provide a unique and complementary capability to the NCA which adds to the effectiveness of our deterrence. Ultimately, the best insurance against Soviet nuclear attack is to redress our traditional neglect of the defensive side of the strategic equation and to continue to support the President's SDI as a top defense priority.

[The following response to Admiral Zumwalt's addendum to his testimony, supra, was subsequently supplied for the record by Dr. Epstein:]

Epstein Response to Zumwalt Addendum #2 May 20, 1987

First, I must take issue with Admiral Zumwalt's characterization of my views. I do not, as he puts it, "attempt to reduce deterrence to a simple, static discussion of target coverage." Of course deterrence requires that we "convince [the] Soviet leadership that their aggression would result in unacceptable costs." But, to convince them, one necessary condition--in addition to political will--is surely the technical capacity to cover a broad array of military and other targets in retaliation to a well-executed Soviet first-strike.

Remarkably, Admiral Zumwalt does not dispute a single one of my estimates regarding our current or projected retaliatory capability. The numbers are sobering.

For example, a conservative Soviet planner would have to bank on a U.S. strategic retaliatory capability of some 6,900 warheads today, more than enough to cover a wide range of strategic, conventional, command, and military infrastructure targets, while holding in reserve the assured capacity to obliterate the Soviet Union as a society.

Under circumstances in which either belligerent can visit total annihilation on the other the "clear superiority in ICBMs and megatonnage" which concerns Admiral Zumwalt is meaningless militarily. Even where superiority has been real, moreover, "the political benefits that attach to nuclear superiority"--to use Admiral Zumwalt's phrase--have not always been clear. Nuclear superiority did us no good against Vietnam, and it seems to be doing the Russians no good in Afghanistan.

Our already imposing target coverage capacity will grow dramatically with the planned deployment of Trident II/D-5. In the Congressional Budget Office's estimation, our prompt hard-target kill capability will quadruple. Even so, I am not--as Admiral Zumwalt suggests--"sanguine that this system alone is the answer to our nuclear deterrence requirements." In my Brookings monograph, The 1988 Defense Budget, not only is the Trident II/D-5 fully funded, but so are the administration's requests for C^3, for stealth and non-stealth cruise missiles, and B-1 bombers. I also support continued research and development (but not procurement) funding for the stealth bomber and completion of our deployment of 50 MX missiles in silos.

Now, Admiral Zumwalt may have some special insight into their perceptions, but if the Soviets are not already deterred, I do not see how they will be any more deterred by an indiscriminate buying spree on our part.

In particular, the Soviets--presumably because of our projected hard-target kill capabilities--are evacuating some of their ICBM silos in favor of land-mobile missiles noted by Admiral Zumwalt. It is not efficient to continue spending vast sums on the capacity to destroy hard point targets when that (shrinking) category will be well-covered. Both area-mobile Midgetman and rail-mobile MX missiles would be superfluous from a target coverage standpoint even on the questionable assumption that they would prove survivable in the post-SALT world in which there are no constraints on Soviet offensive forces and barrage capabilities.

Finally, regarding the Strategic Defense Initiative (SDI), I do not believe literally comprehensive strategic defense (against all strategic delivery systems) to be a realistic goal. Partial defenses would, at worst, be destabilizing; at best, they could further enhance deterrence. If, therefore, the most that can be gained from SDI is a further enhancement of deterrence, the first question is whether it is urgent that deterrence be enhanced further. Given our existing, and planned, retaliatory capabilities, I do not believe it is urgent. Second, even if the enhancement of deterrence were urgent, it would not follow that the deployment of partial defenses--rather than procurement of more cruise missiles or submarines--would be the most economically efficient or politically prudent way to enhance it. For these reasons, SDI funding is cut substantially in my alternative budget, though a prudent level of research is fully maintained.

All the above, and many related points are fully elaborated in The 1988 Defense Budget (Brookings, 1987) which is included for the record.

Senator Grassley. I did not intend to ask this question, but it does bring up a fact of life, though, that even if we take that measure that you just gave us to judge what we ought to be doing, if we do not have a wise expenditure of the money, one dollar more appropriated for defense does not mean a dollar's worth more of defense.

Admiral Zumwalt. No, sir, that is true, and it is true, I think, in every organization. I have been in business long enough now to know that when you cut a budget, you end up with about the same percentage of waste in a business as you had before. I have never been able to get one to run 100 percent efficiently, and I never was able to get the Navy to run 100 percent efficiently. But man will never be perfect.

You are not going to eliminate waste by reductions. You are just going to cut muscle and waste. The same percentages will remain.

Senator Grassley. General?

General Kent. I am not surprised by the fact that we still maintain the major force elements in the face of cuts. I would be surprised if it went the other way. To a large extent what happens is that procurement of major force elements are stretched out. But worse still, in the face of some of those cuts, the force elements are not provided the means of conducting the operational acts that are required to support campaigns.

For example, you are not going to cut the number of F-16 squadrons; you are going to cut the weapons and the munitions and the sustainability and the readiness. So there is an incentive system that does not quite work in terms of operational output.

REPRICING FLEXIBLE MANAGEMENT TOOL

Senator Grassley. Dr. Epstein, I would like to ask you a question about this phenomenon that we call "repricing". At a minimum I think it shows that the Department of Defense and individual contractors have considerable management flexibility, I guess you might call it.

We are also told that it reveals consistent overpricing for inflation.

My question to you is would it show anything else? Would it for instance show high overhead, unjustified overhead?

Dr. Epstein. I do not know. I imagine that you would have to do a detailed auditing, case-by-case.

Senator Grassley. Well, I do not want to limit it just to overhead, but from your studies would you have anything else that it might show, other than just considerable management flexibility or over-estimation for inflation?

Dr. Epstein. Specifically, you are talking about——

Senator Grassley. Well, when they are all constantly repricing from 1 year to the other, what weapons systems are going to cost.

Dr. Epstein. As I say, I think it makes it complicated for the Congress to use the budget as an instrument of civilian control over defense.

Senator Grassley. From your standpoint it is a problem more for Congress; it is not a problem within the management of the Defense Department that needs to be dealt with?

Dr. **Epstein**. Well. I think it needs to be dealt with, and I am not sure exactly what the source of the problem is.

GROWTH OF THE BLACK BUDGET

Senator **Grassley**. Let me go on to another question, then, dealing with the growth of the black budget. From some studies of manufacturing efficiency and overhead of defense contractors, I guess I have concluded that they are just like a lot of fat overhead accounts.

We have learned also that a lot of these excess costs may be attributable to black programs and activities. It would appear that while industry would accommodate much of our covert budget, in return, government is asked to turn the other cheek when we discover how fat our defense contracts are.

Therefore, it becomes kind of a self-perpetuating process the way I see it turns out. Would you have any comment as you have viewed the turn of events toward such a large part of the defense budget being in these accounts that we call kind of covered up through the black programs?

MUST SPECIFY MISSIONS FOR STRATEGIC FORCES

Dr. **Epstein**. No; I am interested in the sort of larger force planning issues that we are confronting in the budget as a whole. I guess my attitude, listening to Admiral Zumwalt—his testimony strikes me as sort of an encyclopedia of erroneous measures that should not be allowed to guide our defense planning. When we talk about increasing strategic forces, it is not to rectify some meaningless ratio in strategic offensive inventories. We ought to be doing what General Kent is talking about and what I am talking about, and that is specifying the missions for which our strategic offensive forces are designed, evaluating using the best methods we can, whether or not they can achieve those objectives in a second strike, and where they cannot, rectifying the deficiency in the most efficient possible way.

I do not think the most efficient possible way is to buy every weapon that we can. I do not think it is necessary to penetrate Soviet air defense five different ways concurrently, as we are now. I do not think it is necessary to be fielding two follow-ons to the Minuteman missile. I do not think there are going to be enough counter-force targets in the Soviet target base to use all the hard target kill capability we are going to buy. The Trident submarine alone is going to have 4,800 hard target killers when it is deployed. We will also have a Stealth cruise missile and other capabilities to attack hardened Soviet targets.

In fact, our hard target kill capability is so good that they are leaving their silos, and even though they are evacuating silos, we are spending more and more money in order to kill point hard targets.

So I think these are the types of big choices that are in fact necessary and in fact will save us money if they are made intelligently.

As a second question, I think paying respectable prices for the weapons that are bought is, of course, the next matter. And I am less qualified to address that than I am the——

Senator GRASSLEY. General Kent?

BLACK PROGRAMS GROWING

General KENT. One of your questions had to do with the increasing number of black programs. I think that is a worrisome trend. I, too, am concerned about output, but black programs are many times not integrated into the grand scheme of things and the framework that I described, and accordingly, I think we must be concerned about the increasing number of these programs.

At the same time, the proliferation of black programs is probably an indictment of the present system. One of the reasons you have a black program is to cut down the turmoil of your program—and it does. Black programs generally are conducted more efficiently than other programs in terms of providing a piece of hardware on time and without starts and stops. That is not to say that it might be the optimal or correct operational output, because, they in some instances may not be integrated into the total context of planning.

Admiral ZUMWALT. Just in response to Dr. Epstein's remarks, that kind of comment strikes me as sort of the fatuous pettifoggery that we get from highly intelligent, patriotic young men who do not have operational experience.

U.S./SOVIETS BACK EACH OTHER DOWN

During the Cuban missile crisis, I saw us deliver an ultimatum to the Soviet Union, confident that the Soviet Union would have to back away because of our preponderance of strategic nuclear power. Eleven years later, as a member of the Joint Chiefs of Staff, I saw us back away in the face of a Soviet ultimatum in the Yom Kippur War because we knew that we were so badly outpointed in the field of strategic nuclear power.

Now, when you talk about all of those weapons that we are going to have, you are speaking in the abstract, and not focusing on what it is that we have lost after the Soviet first strike.

The war games that have been done by the Joint Chiefs over the years have shown a steady deterioration in our capability. And today, the Soviet Union has—as the President has confirmed publicly—an impressive strategic nuclear superiority that forces us to be realistic and do what any rational, inferior military power ought to do rather than lose a war—to accommodate. And we are doing so and will continue to do so until we have regained our strategic nuclear capability.

Now, with regard to the conventional matter, Dr. Epstein has pointed out that we have strategic lines of communication to our allies and has completely overlooked thereby in his comment that that walks right into the Soviet concept of how to fight us.

We would no more try to defend our sea lines to Europe and South Korea by setting up walls along those lines than SCAT. We need the carrier task forces that the Navy has been getting in order to be able to get up there and operate in juxtaposition to the flanks to keep the Soviet forces deployed in all directions, in order to be able to get those logistics through.

You can come up with a whole set of simplistic assumptions, and I have done this as Director of Systems Analysis, and I can tell you the difference between operational experience and analytical work is an order of magnitude of difference. You can come up with all kinds of answers that make simplistic sense. But when ~~you~~ throw in operational factors, you come up with different answers.

I think it is very important not to give too much weight to those who have not had to fight the war.

Chairman CHILES. You time is up. I do not know, Dr. Epstein, do you want a rebuttal or sur-rebuttal?

Dr. EPSTEIN. I have a reply to his comment, sure. First of all, I am glad we are all in a forum where we have enough integrity to address each other's comments on their merits. And I would like to know what specifically are the strategic targets that we cannot cover that we ought to be able to cover if our inferiority is so massive.

I would also call the Admiral's attention to something. People talk about accommodation and appeasement, and they hark back to Munich. Well, one of the lessons of Munich is that an over-assessment of German confidence contributed to the policy of appeasement, and there are dangers of inflating the threats we face to the point where resistance does not seem to make much sense.

GENERAL ASSESSMENT OF U.S./SOVIET CAPABILITIES

We are outspending the Soviets in combination with our allies and have done so for the last 20 years. We are putting more in, but it is alleged they are getting much more military capability out. They therefore must be more efficient in some respect than we—but the source of this efficiency is never disclosed. Their allies are less reliable than ours. We are way ahead in important areas of technology. We train twice as much as their forces; the training is much more realistic. Defenders have inherent advantages; they fight on familiar terrain. They can operate from prepared, concealed positions. The attacker has to come out into the open in order to advance, exposing himself to fire.

These are operational factors, Admiral, that you never seem to mention. You hark to the Yom Kippur War. In the Yom Kippur War, the Israelis scored an exchange ratio in the air of 40 to 1. Why? Because of superior technology and superior training.

General Gabriel, when he was Chief of Staff of the Air Force, said that we were 10 years ahead of the Russians in fighter technology. Our training is much more realistic. We train almost twice as much as they do. I do not expect us to get 40 to 1 in the air, but they do not outnumber us by nearly that amount.

STRATEGIC EXCHANGE SCENARIO

Admiral ZUMWALT. The facts of the matter are, to answer your question about what happens in a strategic exchange, with firing less than half of their huge super missiles, the Soviet Union has the capability to destroy almost all of our ICBMs, all the bombers that are not airborne, and that 50 percent of our submarines that have not gotten to sea.

The President then has a situation in which on the order of 10 to 20 million Americans have been killed, and the Soviets have withheld a significant strategic reserve, and he has at sea his submarines which, by Congressional and Presidential policy, have been kept inaccurate so that they cannot retaliate against hard targets until Trident-II is fully deployed. We are correcting that now.

The President then faces a situation in which he can fire at Soviet cities, most of which probably will have been evacuated in a period of strategic warning, and with impressive civil defense capability, will kill on the order of 20 to 30 million Soviets and expect a retaliatory attack that would kill on the order of 100 million Americans.

Those are the kinds of odds that make a President and a group of Joint Chiefs of Staff decide that they should not risk a challenge. Those are the kinds of odds that when the Soviet Union faced them, caused them to back down.

Senator EXON. I sure wish I could jump in here. But Admiral, I just think you are selling short. You of all people, are selling short our ballistic submarines and the new D-5s coming on. It is far superior to anything that the Soviets have from the standpoint of accuracy and from the standpoint of them not being able to hit them. Is that not true?

Admiral ZUMWALT. Unquestionably, unquestionably, that is the case. But for years, by policy, we did not have accurate submarine ballistic missiles; we could not fire at hard targets.

Dr. EPSTEIN. But we are doing something about that now.

Admiral ZUMWALT. We are now doing something about it.

Senator EXON. Yes; we are covering ourselves pretty well.

Excuse me, Mr. Chairman.

Chairman CHILES. I think this has been a good exchange.

Senator Conrad?

Senator CONRAD. Well, I do not want to limit this exchange. I would be interested in hearing from Dr. Epstein his response to the latest hypothetical that Admiral Zumwalt posed. If I just heard correctly, Admiral Zumwalt presented a situation in which the Soviets fire half of their heavy missiles, wipe out all of our bomber force that is not airborne, wipe out the half of our submarines that have not left base, wipe out all of our ICBMs that have not been fired, and that we are then left with half of our submarine fleet at sea, with missiles that are not sufficiently accurate to hit hard targets.

I would like to know from Dr. Epstein what your reaction is to that scenario?

Admiral ZUMWALT. Those D-5 missiles that are at sea would have accuracy; the others would not.

Senator CONRAD. How many D-5s do we have at sea?

Admiral ZUMWALT. I am not sure we should answer that in open session.

UNITED STATES COULD RESPOND TO A FIRST STRIKE

Dr. **Epstein**. Well, let me begin by saying that even assuming the Soviet ICBMs perform as well as they are currently estimated to perform, and that the United States chooses to ride out this attack, which the Russians cannot sanguinely assume, the prevailing assumption that the U.S. ICBM force would be literally wiped out is just not supported by the available evidence. About 25 percent of the launchers and 26 percent of the warheads, more than 500, would survive. And this finding is consistent with congressional testimony of CIA officials responsible for the analysis of Soviet capability and DOD analyses documented in the CBO Trident-II study that came out this summer.

So all-told, by my current count, a conservative Soviet planner would have to bank on an overall retaliatory capability of some 6,200 American warheads, and it is hard for me to fathom why he should be tempted to initiate the attack.

Senator **Conrad**. Let me just interrupt as we go along here. Sixty-two hundred warheads from us—what is the explosive power of the weakest of those warheads in relationship to the explosive power of what went off during World War II?

Dr. **Epstein**. The short answer is I do not know. My guess is that the lower end of the spectrum would be 50-kiloton weapons, which are roughly four times the explosive yield of the Hiroshima device. You would want to adjust it for area destructive effects and put it in what is called equivalent megatonnage, but in fact——

Senator **Conrad**. Well, it would seem to me that any Soviet leader who would pursue an exchange under those circumstances would be insane.

Dr. **Epstein**. I agree. May I go on?

Admiral **Zumwalt**. So do I.

Dr. **Epstein**. May I just continue with a comment?

RUSSIAN FIRST STRIKE NOT NEEDED

Admiral **Zumwalt**. He should rather expect the United States to accommodate.

Senator **Conrad**. Why would he expect the United States to accommodate? We have just been blasted with everything they have.

Admiral **Zumwalt**. No, no. I am saying he should expect, with his immense advantage, the United States will not require him to initiate his exchange. The Soviet Union expects to use their strategic nuclear superiority and their tactical nuclear superiority as a shield to force acquiescence on the part of the West while they carry out their mischief at the sublimited level, as they are doing.

THREAT OF FIRST STRIKE BIG WEAPON

Senator **Conrad**. Well, let me ask you this, Admiral Zumwalt, and then I want to get back to Dr. Epstein. From what I am hearing, you would trade our strategic forces for the Soviet strategic forces.

You would trade our strategic forces, our submarine force, our bomber force——

Admiral **Zumwalt**. I would not.

Senator **Conrad**. You would not.

Admiral ZUMWALT. I would not.

Senator CONRAD. Well, wait a minute. You just said that theirs was superior.

Admiral ZUMWALT. That is right.

Senator CONRAD. Why wouldn't you trade?

Admiral ZUMWALT. Theirs is superior in part because they can strike first and I cannot. If I traded, I still could not strike first.

Senator CONRAD. That leaves me confused. If they have a superior force to ours in strategic weapons, explain to me why you would not trade.

Admiral ZUMWALT. The major punch of the Soviet Union is in their 308 SS-18 missiles.

Senator CONRAD. Right, potential first strike.

Admiral ZUMWALT. Those are safe in Soviet possession. They are not safe in my possession; they would be gone in the first strike.

Senator CONRAD. Why isn't the alternative true?

Admiral ZUMWALT. Because we will never strike first.

Senator CONRAD. But we assume they will.

Admiral ZUMWALT. If there is going to be an exchange, it will be initiated by the Soviet Union, in my judgment, without a question.

Chairman CHILES. Admiral, I understand you had a plane and that you had to leave. We are delighted to have you here, but if you have to leave, we do not want you to miss your plane.

Admiral ZUMWALT. Thank you, Senator. It has been a pleasure to be with you.

Senator EXON. Can I ask you one question before you leave?

Chairman CHILES. Do not make him miss his plane.

FIRST STRIKE DEFINED

Senator EXON. I will not make him miss his plane.

When you talk about first strike, are you talking about the old-fashioned, bolt out of the blue, surprise first strike, Admiral—I mean, the one that is classified, although it is commonly written, that a few minutes from now, they will start arriving—is that what you are talking about as a first strike?

Admiral ZUMWALT. I am talking about a Soviet decision to fire first.

Senator EXON. Well, I mean, are you talking about a bolt out of the blue?

Admiral ZUMWALT. It could come that way; it could come after a period of strategic mobilization in which event we would have more submarines at sea, and they would have more cities evacuated.

Senator EXON. I know you realize and recognize that the bolt out of the blue is an old-fashioned strategy that is not relied on very much by most military experts today; you agree with that, don't you?

LAUNCH UNDER WARNING

Admiral ZUMWALT. Yes, sir, I do. Unfortunately, we are hearing a lot of so-called experts talk about the fact that we can launch under warning, and that, in my judgment, is a terribly dangerous policy as well.

Dr. EPSTEIN. I could not agree more.

Senator CONRAD. Could I follow up, Mr. Chairman, with my time and ask Dr. Epstein to respond?

Chairman CHILES. Yes; Admiral, we thank you for your attendance today.

Senator DOMENICI. Thank you very much, Admiral.

Admiral ZUMWALT. Thank you for having me.

Dr. EPSTEIN. Let me just interject that I do not advocate that the United States adopt a policy of launch on warning, nor do I think it is necessary to adopt a policy of launch on warning.

PROGRAMMED U.S. FIRST STRIKE CAPABILITY

Not only are U.S. second strike capabilities programmed to grow, but with the planned deployment, which I support, of the 20 Trident submarines equipped with Trident-II missiles, when you add that to the 50 MX and the Minuteman-III force, the United States will acquire a much better first strike capability against Soviet ICBMs, which hold over 60 percent of their warheads, than the Soviets have ever had against U.S. ICBM's.

Senator CONRAD. Why is that? Let us slow down, because I want to hear exactly why you say that.

Dr. EPSTEIN. I am using published CBO data when I say this.

Senator CONRAD. Good. Tell us precisely why you say that.

Dr. EPSTEIN. OK. Here, let me quote the CBO. "By the year 2000, when 20 Trident submarines would be deployed under the administration's plan, the U.S. inventory of hard target warheads on ballistic missiles would have grown to approximately 6,800 including 4,800 warheads on Trident-II SLBMs, and at least 500 warheads on MX ICBMs."

From the current U.S. inventory of 1,650, all of them less capable than the Trident-II, this represents a literal quadrupling, and in the CBO's view, quote, "would transform the ability of the United States to conduct largescale attacks on hardened targets in the Soviet Union."

Now, let me just be very specific. Programmed U.S. first and second strike prompt hard target kill capability, no Midgetman and 50 MX—these are just technical estimates from the CBO——

Senator CONRAD. It is what is in the mix right now; in other words, we are not talking about any——

Dr. EPSTEIN. It is what is programmed——

Senator CONRAD. What is programmed.

Dr. EPSTEIN. And I support the program for the Trident-II. But the two-shot kill probability against targets hardened to 5,000 psi, harder than any targets we know of, for the Trident-II, is 86 percent—a CBO number—and for one warhead from MX and one from Minuteman-III, cross-target on the same targets, 86 percent.

All right. Now, the number of targets we could attack in a first strike that way is 2,400 with Trident-II and 500 with MX and Minuteman-III-A. The expected number of targets destroyed is 2,494. The number of hard targets out there is about 1,400 silos and maybe 600 hardened command and control.

On a second strike, the maximum number of targets attacked would, on my present calculations, be 1,920 with Trident-II, 125 with MX and Minuteman-III. That assumes an excellent first strike from them.

Senator CONRAD. That is a 25-percent survival?

Dr. EPSTEIN. Exactly, exactly. Expected targets destroyed, 1,651 for the subs, 108 for the missiles—1,759.

Now, those are excellent capabilities. I am assuming 80 percent reliability just like CBO. So we have substantial hard target capabilities coming on-line for first strikes and for second strikes. In fact, in this light it is difficult for me to see any rationale for deploying Midgetman or further MX from the point of view of target coverage.

Senator CONRAD. Lieutenant General Kent, would you care to respond?

General KENT. I agree in general with what Dr. Epstein has said. Perhaps I can put it in somewhat simpler terms and more operational terms.

If the Soviet Union attacks the United States, we would want to keep track of what they can kill, but more importantly, we want to keep track of what we have left. And what is left is the submarines at sea and the bombers that were on alert.

For the moment, I will just talk about ballistic missiles. I start with the assumption that we are going to have 3,000 RVs on SLBMs at sea. So we have a residual of 3,000 weapons from a Soviet attack. And this assumes that all our Minutemen are destroyed.

Now take a look at an attack by the United States—a first-strike attack against the Soviet Union. They have 6,000 RV's in about 1,500 silos. If we concentrate the attack of our Minuteman-III RV's (the Mark-12's and the Mark-12-A's, of which there are around 1,500) on the most lucrative of these silos, we can kill more than 3,000 of those 6,000 RV's. As a matter of fact, the number may be as high as 3,500. That would leave them 2,500 ICBM RV's, plus whatever RV's they have at sea, which in normal, day-to-day alert is very small. The number might grow in a generated alert to over 500, and possibly as high as 1,000, but I think that would be the outside.

If you add it up, the Soviets would have about the same number of ballistic missile RV's remaining if we struck first as we would have if they struck first.

In addition, we have a much more robust bomber force. It is interesting to note that the following statement makes a lot of people sit up short. If the Soviets strike us, they cannot kill more than 2,000 RV's in our ICBM force. That is a deterministic figure, because that is all the RV's there are in the Minuteman force—2,100 to be exact. If we attack the Soviet Union, we can kill more than 3,000 RV's.

This demonstrates the danger of these static measures that do not take into account the complex interaction of forces and thus lack an operational content.

Senator CONRAD. Mr. Chairman, if I might ask one more question of Lieutenant General Kent——

Chairman CHILES. You are impinging on Senator Domenici's time.

Senator DOMENICI. Go ahead.

Senator CONRAD. Thank you.

Would you trade our strategic forces for the Soviets'?

General KENT. It would not be close. We would not trade.

Chairman CHILES. Senator Domenici?

SUSTAINED DEFENSE BUDGET WOULD SAVE MONEY

Senator DOMENICI. Mr. Chairman, I do not want to ask any questions or engage in this discussion with reference to strategic parity or superiority.

But I think that it would serve a purpose, especially with Senators like Senator Exon who are on the authorizing committee, to just make a point. Frankly, there is no question in my mind that the United States is going to waste a lot of money and perhaps order more weapons systems for a given point in time than we think we could afford over a decade or 15 years. We do that because we do not have a sustained policy regarding the defense budget for the United States.

Frankly, when you "go from rags to riches" with reference to the kind of activity that we ask our military men to put their brains through, such as mission-oriented budgeting, and other new concepts General Kent is talking about, and then you have 3 or 4 years where you cut defense 5 or 6 percent per year—I do not know why, but it is as if there is some new idea about the world that says, "Cutting defense is wrong; we must mandate 5-percent growth." Then, along comes President Reagan, and Cap Weinberger who says, "That is not enough; it must be 10 percent for the next 5 years." Frankly, with this kind of behavior, we are not going to get very good implementation of anyone's planning. We can have your kind, we can have the mission-oriented kind, but the fact remains that the stove is hot so put the pan on it. There might not be electricity there for 10 solid years.

Now, I do not think that is good policy, and I have opposed it, and I have opposed being unrealistic in terms of how much you can pile into the Federal budget in a short period of time.

But to tell you the truth, I do not think, looking at your numbers, Dr. Epstein, I do not think the fact that you would not have to add anything more to defense and you would still spend $200 billion necessarily reveals that we have bought more weapon systems than we can afford.

Dr. EPSTEIN. I did not say it did, Senator.

Senator DOMENICI. You did not, but somebody used it in a question and in a series of responses, it sounded like that was relevant to that. It may be relevant, but it may not be. It may be that we need every one of those weapons that we have already bought.

CONGRESS PUT WEAPONS SYSTEMS IN BUDGET

My last point is, it is not all the fault of the military planners, it is not all the fault of Secretaries of Defense or Presidents; we the Congress have got to take a little blame ourselves, because we put all those weapons systems in, and we either did it because we did not know what we were doing, or we did know what we were doing—or maybe a little of both—and then we wanted to keep it ongoing; nobody wanted to take any of those out. It gets to be a neat domestic program. Somebody has got these programs in their backyard or in their seaport, or someplace where they have just announced a new plant. It has become a very, very complicated kind of problem with reference to local politics.

And I will tell you, General, if we used your concept and had it all nicely worked out, we would nonetheless add 10, 15, 20 percent for the Congress "druthers" and you know that, and they would be around the periphery of your concepts and mission-oriented planning, and that is a lot of money.

So I would hope that this year we would make a serious effort—and I hope the authorizing committee does, Senator Exon—a serious effort to cull out systems, or on the other hand, to just go ahead and commit to them; where there is something there that we are really going to buy, and quit fooling around with it with inefficient production rates.

You have made the point, and they have all made the point that if it is *x* number of wings of new fighters, why stretch them out so we can buy 16 other systems as well?

SERVICES WISH LISTS

And my last comment is I think it has been historically inevitable that when you have three branches of the military service, regardless of what you try to do with the Joint Chiefs, that you have wish lists, and the wish lists grow, and the wish lists get more important as we do not fund them. And then an administrator comes along that wants to fund defense and there is a new pot of money, and perhaps wish lists then take on a tremendous mission relevancy and maybe we started buying some things we did not need. Now, none of that speaks to what some are saying that we ought to cut the defense budget substantially. I do not really believe that at all. I think that day is gone. It has got to go up a little bit. But I think we can all do a better job of making sure that we do not contribute to what is already a very, very difficult job in a democracy which is the military and the executive branch and Congress working together.

Thank you, Mr. Chairman. I think the hearings have been very enlightening to the committee, and I greatly appreciate participating in them.

Chairman CHILES. Thank you, Senator.

IS TOP LINE GROWTH REVEALING MEASURE

I would like to ask both of you a question on this "real growth" problem. We know that a number of years ago we started to use real growth as the measure of what we were doing in defense. Since that time, we have invested about $2 trillion in defense, and we have come close to doubling the base structure. Yet we still hear the argument that if the top line does not grow and does not keep pace, we are falling behind, and we have to do this, and we have to do that to keep up.

We look at this CBO study that says that we can have at least $32 billion in increases. Is top line real growth an adequate or a revealing measure?

Dr. EPSTEIN. No; I do not think it is a revealing measure. Among other things, it ignores the contributions of allies. It ignores many of the asymmetries in the global military situation.

For example, there are geographical constraints that the Russians would have to overcome in attacking our sea lanes. We can exploit those with a defensive sea control strategy that requires perhaps a 12-carrier fleet. To actually execute the type of offensive missions contemplated in the maritime strategy, my current calculations indicate that we would need, really, a 26-carrier fleet, at 10-year expenditures exceeding those of the 15-carrier Navy by about $275 billion.

This is out of the question budgetarily, and it is unnecessary militarily. We can defend the sea lanes with a defensive strategy with 12 carriers, not authorize another 2, and reprogram the moneys to areas that deserve higher priority. If we are worried about the conventional imbalance on the ground in Europe, we should look into ways of spending the money there. If we are acquiring two successors to the F-15 aircraft while letting the close air support mission languish, we should look into reallocating there.

The question is not how much you are spending; it is how smartly you are spending it, and how clearly and with what rigor you have analyzed the actual requirements for executing your global strategy. I think that is the real question. And if the answer is we need to spend 10-percent real growth, then that is what we should spend.

Chairman CHILES. General Kent?

BUDGET LEVELS NOT REVEALING

General KENT. I think budget levels are not a revealing way to understand (1) whether our security is enhanced, or (2) whether we are spending our money at the best margin of return.

To go back to the statements made earlier, there is one problem of deciding the number of major force elements—F-16 squadrons, numbers of ships, and so on that are to be procured. That is an important problem. But I contend that there is a problem of equal importance, and that is looking at the dazzling array of line items in a budget submitted to the Congress, labelled with acronyms that are mind-boggling that you do not know quite what they are about to begin with, and if you know what they are about, you do not know where they fit.

I am talking about the second tier, items that are generally called "systems". Invariably, the acronym ends with "S" that says it is a "system". At one time, I tried to keep on top of these many items; I no longer do and do not understand how anyone in Congress would be expected to.

We end up in sort of a mindless, put-and-take, on those line items. The actions are more budget-related than operationally related. These proliferated line items are just as serious a problem to deal with in the relationship between the Congress and the Department of Defense as it is to decide how many of the major force elements are to be procured.

To underline what I am saying, it must be of concern that when we make an assessment of how many armored fighting vehicles are going to kill per F-16 sortie, the numbers come out to be a disarmingly low number.

I believe that the opportunity is here with technology of weapons and munitions to increase those numbers of kills per sortie by a factor of 10.

To give some kind of reality of what I am talking about, an F-16 sortie goes out—not now, today, but when we have them—loaded with SKEET munitions. This is in the planning. (A SKEET, as you know, is a smart munition that seeks out the warm engines of tanks or other vehicles and shoots a self-forging fragment through the engine.) The F-16 has four TMDs (tactical munitions dispensers) onboard. Each dispenser contains 40 of those warheads. So 4 times 40 is 160 warheads. We should not be satisfied until we can attain many more than 10 kills per sortie out of those 160 warheads.

A well-defined operational concept could define how we are going to make a significant improvement, and then we buy everything to make that building work, including the onboard engagement systems, the weapons and the munitions. I think the greatest opportunity for best marginal return to enhance our security, is to look at how to increase operational output from the major force elements we plan to procure.

B-52S GOOD SOURCE FOR INTERDICTION

We have other opportunities. We have 69 B-52Gs that might be retired. We could convert these B-52's into a powerful force for interdiction around the world by equipping them with conventionally armed stand-off cruise missiles. There are opportunities like that, and it is these opportunities on which we ought to focus. There are buildings we ought to examine and if judged worthy we should ensure that those buildings are built to completion and that we do not have just the frame of many buildings without finally making the building so it is a useful and most effective entity.

Chairman CHILES. Dr. Epstein?

Dr. EPSTEIN. If I could just ask General Kent to pursue an interesting point he raises, would you include maritime strike operations in the types of operations that B-52s with stand-off conventional cruise missiles could perform?

General KENT. Well——

Dr. EPSTEIN. For example, the Institute for Defense Analyses did a study in 1983 which shows cruise missile carriers, aircraft, to be much, much more cost-effective than aircraft carrier battle groups as a means of delivering land attacks. And this is an example of an opportunity, it seems to me, that we have for making efficient substitution of one weapon that still has a viable service life for others that are vastly more expensive and not clearly more cost-effective.

General KENT. May I expand positively on the aspect of the B-52's. With B-52's, you can interdict the rail networks in Eastern Poland which, by happenstance of history, are very scarce. From Warsaw to the east, there are only seven major rail lines that connect the western military districts in the Soviet Union, to the Central Front. These rail lines are subject to interdiction by dropping mines along them, as well as (with stand-off cruise missiles) directly attacking the Soviet military forces if they attempt to proceed on the roads. The roads are also scarce. And if we stop the rail lines, the roads would be clogged and be very susceptible to interdiction.

I now reference the book that I talked about earlier written by Dr. Epstein about Southwest Asia. The book shows in detail, that the Soviets, in order to move to the south to overrun any lodgement that we might create to the north and east of the top of the Persian Gulf in the Zagros Mountains would have two mountain ranges to traverse that are very formidable. They are characterized by narrow defiles and bridges that span canyons and those bridges can be destroyed by stand-off cruise missiles. In short, B-52's with stand-off cruise missiles with conventional warheads can do very important interdiction roles in defeating the Soviet campaign.

It is those kinds of things that we ought to look for—a well defined operational concept of how to accomplish important operational acts—by whatever service. At the same time we must know that somebody else has shown how this capability fits into a larger picture of how such a capability allows us to conduct our campaign, to underwrite our strategy. We should fix in our minds the buildings that make the most difference and fund them, and stop the turmoil of a dazzling array of individual line items.

Chairman CHILES. Thank you.

DEFENSE DEPENDENCY ON FOREIGN SUPPLIERS

One of the increasing concerns to me is the dependency that we are now building up on foreign suppliers for key components to our advanced weapons systems. Today, a dozen Japanese manufacturers dominate one of the core electronics technologies for the most high-technology defense systems. Dynamic RAMs, for random access memory circuits, make many of our systems operate.

Furthermore, we face a situation where massive Japanese cooperation programs are being developed to gain a monopoly on the technology needed to put tens of millions of transistor elements into a single chip.

What action should we begin to take to regain our capabilities in this area, and is this a legitimate concern that I have—and that many others share?

Dr. EPSTEIN. I am sure it is a legitimate concern, sir.

General KENT. I share your view that it is of increasing concern. I must admit that I have not looked at it in enough detail for my comments to be worthy of this group, except to say somebody must examine that.

Chairman CHILES. Well, in some of your spare time, General, if you would look at that, and if you have any thoughts, I would like to have them, and the same thing for you, Dr. Epstein. It is an area that this committee is going to go into further, and we may well have to do it in some closed sessions, but it is an area that we are going to look at.

PROGRAM PRICING CONTROL PROBLEM

Dr. Epstein, in your review of the 1987 defense budget, you discuss the pricing problem that Congress has had. The chart we have lists 25 programs in 1986 that experienced rather substantial reductions without any reduction in quantity. Ironically, it seems that most of those reductions came from the Navy. In the Navy shipbuilding lines alone, nearly $1 billion was saved, again with no reduction in quantity.

EXAMPLES OF 1986 DOLLAR REDUCTIONS WITH NO CHANGE IN QUANTITIES

(In Millions of Dollars)

ITEM	DOLLAR REDUCTION	PERCENT REDUCTION
ARMY AIRCRAFT		
EH-60A (Helicopter)	25.6	21.6
UH-60A (Helicopter) Blackhawk	67.8	25.4
ARMY MISSILES		
MLRS (Multiple Launch Rocket System)	79.7	15.7
ARMY WEAPONS AND VEHICLES		
Bradley Fighting Vehicle	295.6	29.4
NAVY AIRCRAFT		
EA-6B (Electronic Warfare) Prowler	68.5	15.3
AV-8B (V/STOL) Harrier	229.9	25.8
F-14A/D (Fighter) Tomcat	72.3	11.1
F/A-18 (Fighter) Hornet	507.7	20.4
CH/MH-53E (Helicopter) Super Stallion	46.0	17.7
SH-60B (ASW Helicopter) Sea Hawk	101.1	32.0
P-3 (Patrol) Orion	36.1	10.9
E-2C (Early Warning) Hawkeye	35.7	10.9
NAVY MISSILES		
BGM-109 Tomahawk	72.8	10.9
Phoenix (Air-to-Air Missile)	41.4	12.0
SM-2 MR (Surface-to-Surface/Air Missile)	31.2	6.1
Laser Maverick (Air-to-Ground Missile)	42.7	22.0
MK-46 (Torpedo)	18.8	17.8
NAVY SHIPBUILDING AND CONVERSION		
Trident (Ballistic missile submarine)	202.2	15.8
SSN-688 (Attack submarine)	312.9	14.7
CG-47 Aegis (Cruiser)	315.2	11.5
TAO Fleet Oiler	7.4	23.6
AIR FORCE AIRCRAFT		
F-15D/E (Fighter) Eagle	387.4	20.4
F-16C/D (Fighter) Falcon	159.8	6.7
C-5B (Transport)	300.6	15.5
AIR FORCE MISSILES		
GLCM (Ground-Launched Cruise Missile)	91.9	16.9
TOTAL	3550.3	

Senate Budget Committee Staff, January 10, 1986

Chairman CHILES. What should Congress do when it is able to make these kinds of reductions without any apparent change in programs?

Dr. EPSTEIN. I am not sure. Someone must be accountable, and some sort of disciplinary action should be available to the Congress in the event that prices are so inexact and malleable and fluffy as to eliminate from Congress' hands one of the principal levers of policy control at its disposal. When you pull these levers and nothing happens, that is very disturbing.

Here, we worry about matching strategy and force structure. Well, suppose we did that perfectly and manipulated the budget in our conviction that we had made an intelligent decision about altering the force structure, and you manipulate the budget and nothing happens? I think it really makes a mockery of civilian control outside the government.

Chairman CHILES. Obviously at some stage we will estimate the wrong way, or the appropriators will, and maybe we will cut some muscle or some bone. It has happened more than once, we have seen things squeezed down and reduced, and I have listed some of them here. But when we do not see any kind of change in quantities, the only thing that the appropriators can think, is there is a lot of fat in there, a lot of "squeeze room" and we had better squeeze up some more.

At some stage we may take some action that works the wrong way because of that.

Dr. EPSTEIN. I agree.

Chairman CHILES. Are there actions that Congress should take in addition to what occurred in the 1987 appropriation bill in an effort to control contractor profits and in that area?

Dr. EPSTEIN. I am afraid I am not completely informed on the actions that took place, but I think the Defense Department's own studies indicate that defense contractor profit margins are considerably higher.

Chairman CHILES. Well, we have heard there has been some significant overfunding of pension funds by defense contractors. Is that something we should look at or take some action to recoup those funds?

Dr. EPSTEIN. I really do not consider myself qualified in that area.

Chairman CHILES. We want to thank you both for a most interesting hearing, and Admiral Zumwalt, in his absence. I think we have had a spirited hearing, and it is helpful to us as we go forward with our decisions.

Thank you very much.

Dr. EPSTEIN. Thank you very much, Senator.

Chairman CHILES. We will recess.

[Whereupon, at 11:25 a.m., the committee was adjourned.]

The 1988 Defense Budget

Studies in Defense Policy

Joshua M. Epstein

Studies in Defense Policy

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STUDIES IN DEFENSE POLICY

THE 1988 DEFENSE BUDGET

Joshua M. Epstein

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FOREWORD

THE same factors that led Congress to reduce the defense budget for fiscal years 1986 and 1987 are present again this year: intense pressure to lower the federal deficit, congressional unwillingness to cut spending on domestic social programs, and the president's refusal to raise taxes. As a result, there is general agreement that the Reagan administration's defense goals will not all be achieved. No consensus exists, however, on which of the competing programs—from a space-based defense of the United States to the conventional ground defense of Western Europe—deserve priority.

Meanwhile, during the past year, one arms control treaty has been abandoned (SALT II), another is under severe strain (the ABM Treaty), while yet others are newly proposed (for intermediate nuclear forces in Europe). Rarely, it would seem, has force planning been in such a state of flux. Under the circumstances, clear thinking about the military balance, security priorities, and the relative efficiency of competing alternatives is especially needed.

In this study, Joshua M. Epstein, a research associate in the Brookings Foreign Policy Studies program, challenges the administration's priorities, identifies inefficiencies in its defense proposals, and presents an alternative defense plan. After systematically assessing U.S. nuclear and conventional requirements, he offers specific recommendations that would save nearly $50 billion over two years without detriment to the security of the United States or its allies.

The author acknowledges the valuable suggestions of John D. Steinbruner, Paul B. Stares, Martin Binkin, Charles L. Schultze, and Barry M. Blechman. He also extends deep thanks to Lisa B. Mages for research assistance, to Daniel A. Lindley III for verifying references and tables, to Ann M. Ziegler for secretarial support, to Caroline Lalire for editing

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BRUCE K. MACLAURY
President

May 1987
Washington, D.C.

THE 1988 DEFENSE BUDGET

THE LARGEST peacetime military buildup in American history is apparently over. Following unprecedented growth in defense appropriations from 1981 through 1985, to levels surpassing those of the peak Vietnam years, Congress imposed a real reduction of 4.2 percent in fiscal 1986, and another reduction of 2.5 percent in fiscal 1987. Compared with the Reagan administration's defense boom years of 1981 and 1982—in which growth rates of 12 percent were recorded—these cuts represented a major reversal (figures 1 and 2).

Many factors contributed to the turnaround. For one, the Central Intelligence Agency reassessed the growth rate in Soviet military spending in 1983. In contrast to the relentless buildup that had been portrayed—and that had undergirded the Pentagon's budget requests—the Soviets were found to have cut their real defense growth rate in half, from 4 to 5 percent (for 1970–76) to 2 percent a year from 1976 to 1983. Especially notable was the CIA's finding that Soviet military procurement in particular was stagnant; it did not grow at all in real terms for the entire seven-year period.

Not only were the Soviets spending less than had been claimed, but numerous Pentagon procurement "horror stories" called into question the efficiency with which the Defense Department was managing its own funds. To the infamous overpriced coffee pots and toilet seats were added the more significant testing distortions and operational failures of the Sergeant York divisional air defense (DIVAD) system, which, under duress, the Pentagon cancelled, and the Bradley fighting vehicle.[1]

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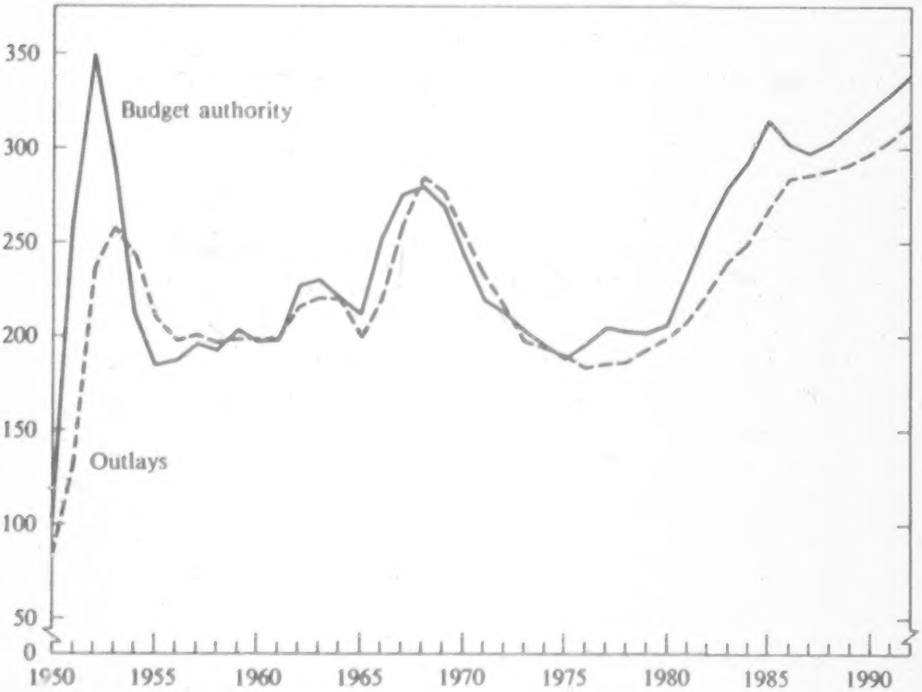
[1] A November 1986 General Accounting Office report characterized the Bradley as being more vulnerable to antiarmor weapons than its predecessor, the M113 armored personnel carrier. It has also been charged that the Bradley would be unable to ford rivers and streams during combat. See General Accounting Office, *Bradley Vehicle:*

Figure 1. Defense Budget Authority and Outlays, Fiscal Years 1950–92[a]

Billions of 1988 dollars



Source: Unpublished material provided by the Office of Management and Budget. The numbers for 1987–92 reflect the president's fiscal 1988 budget request.

a. Comprises the Department of Defense military subfunction (051).

Today's serious problems with the B-1 bomber,[2] a cornerstone of the Reagan buildup, have merely enforced the impression of managerial laxity.

The single most powerful downward pressure on the defense budget, however, has been the federal deficit, which climbed to unprecedented

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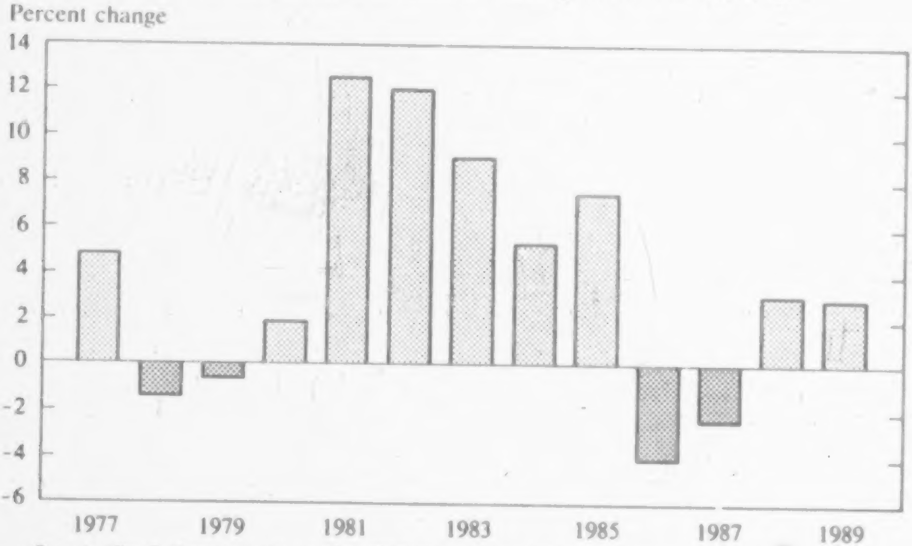
Army's Efforts to Make It More Survivable (Washington, D.C.: GAO, 1986); Fred Kaplan, "GAO Calls the Army's New Troop Carrier Vulnerable," *Boston Globe*, November 6, 1986; John H. Cushman, Jr., "Experts See Risk in Troop Carrier," *New York Times*, September 21, 1986; and John H. Cushman, Jr., "Suit Charges Contractor Lied to Army on Infantry Vehicle," *New York Times*, September 16, 1986.

[2] The U.S. Air Force has requested $600 million in additional funds over the next three years for further modifications and testing of the B-1B bomber. Among the problems that have been encountered in the B-1B are a defensive avionics system that does not meet the required capability, major flight control problems during initial test flights, problems with the bomber's terrain-following radar, and leaks in the fuel tanks. See Molly Moore, "B1 Bomber Repair Fund Is Requested," *Washington Post*, January 7, 1987; and Molly Moore, "Defects Found in B1 Bomber," *Washington Post*, December 4, 1986.

Figure 2. Percent Annual Changes in Defense Funding, Fiscal Years 1977–89[a]



Source: Alice C. Maroni, *The Fiscal Year 1988 Defense Budget Request Data Summary*, Congressional Research Service Report 87-16F (CRS, 1987), p. 15. The 1987 figure is based on an estimate that excludes the supplemental budget request. The 1988 and 1989 figures represent the administration's two-year budget request.

a. Figures are for the National Defense Function (050), which comprises three subfunctions: Department of Defense military programs (051); Department of Energy atomic energy defense activities (053); and defense-related activities—civil defense, operation of the selective service system, and management and acquisition of the strategic stockpile (054).

levels—in absolute terms and as a percent of gross national product—during the Reagan defense buildup (table 1).

Given Congress's unwillingness, particularly in election years, to cut social security or medicare, and the president's refusal to sanction a tax increase, it was inevitable that defense would bear an important burden in deficit reduction. Though it no longer has the force of law, a strict interpretation of the 1985 Balanced Budget and Emergency Deficit Control Act, also known as Gramm-Rudman-Hollings, would require defense reductions in fiscal 1988 of 14 percent from the 1987 level.[3] Such drastic reductions are implausible. But given Democratic control of both houses of Congress, the Reagan administration is unlikely to be granted any increase beyond inflation in 1988; some doubt it will get that. Barring a revolutionary change in the international environment, a budget constraint of zero real growth (at most) appears to be in place.

In practical terms, this means that not all the administration's original goals are achievable: rapid across-the-board modernization of all legs of

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[3] These reductions would be in outlays. Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1988–1992*, 1987 Annual Report, pt. 1 (CBO, 1987), p. xx.

Table 1. Federal Government Surpluses or Deficits in Absolute Amounts and as Percentages of Gross National Product, Fiscal Years 1950–92
Billions of dollars unless otherwise specified

Year	*Total federal surplus or deficit*	*Surplus or deficit as percent of GNP*	*Year*	*Total federal surplus or deficit*	*Surplus or deficit as percent of GNP*
1950	−3.1	−1.2	1972	−23.4	−2.0
1951	6.1	1.9	1973	−14.9	−1.2
1952	−1.5	−0.4	1974	−6.1	−0.4
1953	−6.5	−1.8	1975	−53.2	−3.5
1954	−1.2	−0.3	1976	−73.7	−4.3
1955	−3.0	−0.8	TQ[a]	−14.7	−3.3
1956	3.9	0.9	1977	−53.6	−2.8
1957	3.4	0.8	1978	−59.2	−2.7
1958	−2.8	−0.6	1979	−40.2	−1.6
1959	−12.8	−2.7	1980	−73.8	−2.8
1960	0.3	0.1	1981	−78.9	−2.6
1961	−3.3	−0.6	1982	−127.9	−4.1
1962	−7.1	−1.3	1983	−207.8	−6.3
1963	−4.8	−0.8	1984	−185.3	−5.0
1964	−5.9	−0.9	1985	−212.3	−5.4
1965	−1.4	−0.2	1986	−220.7	−5.3
1966	−3.7	−0.5	1987	−174.0	−4.0
1967	−8.6	−1.1	1988	−169.0	−3.6
1968	−25.2	−3.0	1989	−162.0	−3.2
1969	3.2	0.3	1990	−134.0	−2.5
1970	−2.8	−0.3	1991	−109.0	−1.9
1971	−23.0	−2.2	1992	−85.0	−1.4

Sources: 1950–86 figures are from Office of Management and Budget, *Historical Tables, Budget of the United States Government, Fiscal Year 1988* (Government Printing Office, 1987), pp. 15.6(1), 15.6(2); 1987–92 projections are from Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1988–1992*, 1987 Annual Report, pt. I (CBO, 1987), pp. xiv, 7.

a. Fiscal 1976 transition quarter (July through September).

the strategic offensive triad (intercontinental ballistic missiles, bombers, and submarines); vigorous development of antisatellite capabilities and space-based strategic defenses; modernization of the ground and tactical air forces, with an expansion of the latter to 40 wings; and a 600-ship navy built around 15 large-deck aircraft carrier battlegroups—everything buttressed by a vibrant research and development base, with growing readiness and sustainability for all. Some things will have to give.

Despite a modest accommodation to these fiscal pressures—evident in the administration's 1988 request (tables 3 and 4 below) for a 3 percent real increase in the defense budget—the Pentagon has not come to grips with the problem of choice, or adjusted its priorities in any fundamental way. Continued rapid growth in funding for strategic offensive force modernization (featuring two new intercontinental ballistic missiles [ICBMs], two bombers, and new Trident submarines and missiles), the strategic defense initiative, and two new aircraft carriers would be paid for largely through reductions or decreases in the pace (stretchouts) of other conventional programs (table 2). But are those the right priorities? And if not, how should the defense budget request be altered? More important, can adequate security be provided without growth in defense spending?

A rational attack on that problem requires several logical steps. The first is to identify the core missions for which U.S. forces are designed. In macroeconomic, or large-scale budgeting, terms, these missions are the conventional defense of Western Europe, the Persian Gulf, South Korea, and the air-lanes and sea-lanes to those theaters of war.[4] Overarching these major conventional contingencies is the requirement to deter nuclear attack on the United States and its allies and to terminate nuclear exchanges with minimal damage if deterrence fails. Second, using methods that go beyond the static comparison of peacetime inventories, one attempts to assess the forces' performance in executing these basic missions. Finally, on the basis of these dynamic campaign analyses, one cuts what is superfluous and attempts to rectify any outstanding deficiencies in the most efficient manner.

When this contingency-based assessment is conducted rigorously, some troublesome features of the Reagan administration's defense buildup become evident: exaggerated assessments of Soviet strength; the adoption of strategies (especially naval) that may be infeasible and escalatory; excessive pace in programs of doubtful urgency; inefficient duplications of effort; and questionable priorities.

It is this study's main thesis that the United States can satisfy its

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[4] Though Europe, the Persian Gulf, and Korea are the specific focal points of U.S. conventional force planning, larger alliance or regional security issues, or both, are presumed to be at stake. For example, the security of Israel and Saudi Arabia is of concern in the Persian Gulf and general Southwest Asian context, though for force planning and budgeting purposes a Soviet invasion of Iran is the dominant regional contingency. Similarly, the security of Japan is presumed to be enhanced by a strong U.S. military presence in northeast Asia, though the direct defense of South Korea is (like Iran) the most demanding and prominent of the force planning contingencies.

Table 2. Selected Strategic and Conventional Programs, Fiscal Years 1987–88[a]

Program	*Strategic program costs (millions of dollars)* *1987 estimate*	 *1988 request*	 *Percent change*
MX Missile	1,541.2	1,905.1	23.6
Small ICBM (Midgetman)	1,168.7	2,257.0	93.1
Trident II missile	2,961.8	3,528.5	19.1
B-1B bomber	112.8	415.5	268.4
Stealth bomber (estimate)	4,150.0	4,760.0	14.7
Strategic defense initiative	3,743.4	5,230.8	39.7
Space defense system (antisatellite)	189.3	440.2	132.5
Atomic energy defense activities (Department of Energy)	7,478.0	8,050.0	7.6

Program	*Conventional program quantities* *1987 projection for 1988*	 *1988 request for 1988*	 *Percent change*
AH-64 Apache helicopter	78	67	−14.1
UH-60 Blackhawk helicopter	85	61	−28.2
F/A 18 Hornet	132	84	−36.4
M1 Abrams Tank	840	600	−28.6
M2 Bradley fighting vehicle	870	616	−29.2
High-mobility multipurpose wheeled vehicle (HMMWV)	4,555	3,674	−19.3
High-speed antiradiation missile (HARM)	3,024	2,514	−16.9
AV-8B Harrier	42	32	−23.8
EA-6B Prowler	12	6	−50.0
MK-48 advancd capabilities (ADCAP) torpedo	296	100	−66.2
F-15 Eagle	48	42	−12.5
F-16 Falcon	216	180	−16.7
Advanced medium-range air-to-air missile (AMRAAM)	833	630	−24.4
IIR Maverick missile	7,927	2,701	−65.9

Sources: For strategic programs, *Department of Defense Annual Report to the Congress, Fiscal Year 1988* (GPO, 1987), pp. 206, 209, 212; Department of Defense, *Program Acquisition Costs by Weapon System, Department of Defense Budget for Fiscal Years 1988 and 1989* (DOD, 1987), pp. ii, iv, v, viii, ix; OMB, *Historical Tables, Fiscal Year 1988*, p. 5.1(2); and Joseph F. Campbell, "Stealth Bomber: Program on Track, Growth for Northrop," Paine Webber Status Report, February 13, 1986, p. 3. For conventional programs, Center on Budget and Policy Priorities, Defense Budget Project, "The FY 1988 Defense Budget: Preliminary Analysis" (January 6, 1987), table 6. For a more complete description of the administration's fiscal 1988 and 1989 defense budget, see DOD's *Annual Report* and *Program Acquisition Costs* mentioned above; DOD, *Procurement Programs (P-1), Department of Defense Budget for Fiscal Years 1988 and 1989*; and DOD, *R, D, T, & E Programs (R-1), Department of Defense Budget for Fiscal Years 1988 and 1989*.

a. Growth in strategic programs from 1987 to 1988 is measured in budget authority rather than in weapon systems because many major strategic systems are in development and not yet in the procurement phase. Stretchouts or reductions of conventional programs, by contrast, can be measured by changes in the quantities of weapons requested from one year to the next.

security commitments with no real increase in defense spending if these shortcomings are rectified. Indeed, real reductions are possible without detriment to U.S. security.

The argument to that effect is presented below. While it is contingency based, it takes the Reagan budget request as a baseline, adding or subtracting elements. Theoretically, because every dollar spent on defense can ultimately be connected to some actual or potential military contingency, it is possible to construct the entire defense budget from contingency building blocks (defense of Europe, defense of the Persian Gulf, and so forth). Each budget module would include allowances for planned modernization, routine equipment replacements, and other investment costs, as well as all operating and support expenses. A "zero-based" defense budget so constructed would ideally equal the budget arrived at by subtracting programs from the proposed budget that are superfluous or inefficient or by shifting financial resources from over-funded to underfunded areas, or both. Although part of a longer-term effort to craft defense budgets by construction, this analysis is largely of the request-based, rather than zero-based, type. Key issues and contingencies are focused on, and budgetary alterations are recommended.

Before the key strategic nuclear and conventional policy issues facing Congress are presented, the administration's fiscal 1988 defense request and multiyear plan are examined, in the aggregate and broken down in different ways. Then certain structural features of defense spending are explained. Specifically, in any process, attempts to change course must contend with the momentum of decisions that have already been made. Despite congressional cutbacks, the momentum "stored" in the defense budget is still very great. This backlog of built-in spending is especially pronounced in defense. Since it represents an important constraint in deficit reduction and defense planning, this systemic feature of defense spending should be understood as context to any policy discussion.

The Budget Request and Momentum

The administration's five-year budget authority request and the actual defense expenditures, or outlays, that would result are shown in table 3. These totals can be disaggregated in any number of ways, such as by military service, by appropriation title, by program, and between nuclear and nonnuclear elements. One of the more revealing break-

Table 3. The Administration's Defense Budget Plan, Fiscal Years 1987–92[a]
Millions of dollars unless otherwise specified

Year	*050 account*	*Real growth (percent)*	*051 account*	*Real growth (percent)*
		Budget authority		
1987	289,700	. . .	281,695	. . .
1988	311,967	3.0	303,295	3.0
1989	332,364	2.9	323,299	3.0
1990	353,463	2.9	343,900	2.9
1991	374,979	2.9	364,900	2.9
1992	396,907	2.8	386,500	2.9
Five-year average	. . .	2.9	. . .	3.0
		Outlays		
1987	282,246	. . .	274,200	. . .
1988	297,550	0.7	289,300	0.8
1989	312,197	1.2	303,700	1.2
1990	329,983	2.0	321,000	2.0
1991	349,500	2.5	340,000	2.5
1992	370,851	3.0	361,000	3.1
Five-year average	. . .	1.9	. . .	1.9

Sources: OMB, *Historical Tables, Fiscal Year 1988*, pp. 3.3(4), 3.3(5), 5.1(2), 5.1(3); *Department of Defense Annual Report, Fiscal Year 1988*, p. 325; and information from OMB. The DOD deflators are calculated from Office of the Assistant Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 1988/1989* (OASD, 1987), pp. 54, 56.

a. The 050 account is for the National Defense Function; the 051 account is for the Department of Defense military programs. See figure 2, note a, for further explanation.

downs is between investment and operation and support (O&S) expenses (table 4).

The investment accounts are procurement; research, development, test, and evaluation; and military construction. In these appropriation titles are funds for the so-called big-ticket items—capital projects such as aircraft carriers, stealth bombers, MX missiles, and Star Wars technologies. Investment spending is intended largely to modernize or expand one's force, anticipating tomorrow's threat. For instance, stealth bomber supporters see the radar-evading plane as necessary to penetrate the Soviet air defenses projected for the 1990s and to attack mobile ballistic missiles deployed in the interim.

The Reagan buildup has been investment intensive; the ratio of investment spending to expenditures on operation and support of existing forces is more than 50 percent higher than the ratio recorded over the

Table 4. Defense Department Investment and Operation and Support Request, Fiscal Years 1987–92
Millions of dollars

	Budget authority (051)					
Category	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*
Investment						
Procurement	85,174	83,974	94,624	105,587	115,552	123,305
Research and development	35,994	43,719	44,203	39,586	39,652	42,278
Military construction	5,131	6,592	6,885	7,463	7,721	8,478
Subtotal	126,299	134,285	145,712	152,636	162,925	174,061
Operation and support						
Military personnel	73,761	76,299	76,632	78,336	78,923	79,265
Operation and maintenance	78,536	86,065	90,045	96,549	101,708	106,677
Family housing	3,121	3,484	3,679	4,005	4,047	4,324
Subtotal	155,418	165,848	170,356	178,890	184,678	190,266
Defense Department total[a]	281,695	303,295	323,290	343,900	364,900	386,500

Sources: OMB, *Historical Tables, Fiscal Year 1988*, pp. 5.1(2), 5.1(3); and *Department of Defense Annual Report, Fiscal Year 1988*, p. 325.

a. The total DOD request includes funds for "other" (revolving funds, offsetting receipts, and allowances for civilian and military pay raises and benefits and other legislation). "Other" funds are not included in either investment or operation and support categories for the purposes of this table.

1970s.[5] This change has noteworthy consequences because a long stream of spending commitments results from appropriations for investment, whereas a dollar appropriated for O&S is spent much more rapidly. The rates at which appropriations for investment and O&S are actually spent (their outlay rates) are shown in table 5. Because appropriations made in one year may require many years to spend, there is always a backlog of expenditures to which the Pentagon is committed from budget authority granted in prior years. In fact, even if defense appropriations (new budget authority) were zero for the next five years, national defense spending would total $200 billion, with investment accounting for almost all backlog spending after the first year (table 6).

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[5] Investment/O&S (1971–80) is 0.530; investment/O&S (Reagan, 1981–92) is 0.833; percent change is [(0.833 − 0.53)(100)]/(0.53) = 57. Ratios are derived from fiscal 1971–75 budget authority data from Office of the Assistant Secretary of Defense (Comptroller), *National Defense Budget Estimates for FY 1986* (DOD, 1985), pp. 85–86; and fiscal 1976–92 data from *Historical Tables, Budget of the United States Government, Fiscal Year 1988*, pp. 5.1(1)–5.1(3).

Table 5. Defense Outlay Rates by Appropriation Title, Fiscal Year 1988
Percent of first-year budget authority spent

Appropriation title	*Year* *First*	*Second*	*Third*	*Fourth*	*Fifth*	*Sixth*
"Slow-money" investment accounts						
Procurement	15.00	30.17	26.69	13.59	6.30	1.24
Research, development, test, and evaluation	50.20	38.20	7.57	1.40	. . .	. . .
Military construction	12.36	39.05	22.99	12.86	5.57	3.52
Aggregate for investment group	26.33	33.22	20.28	9.59	4.21	0.95
"Fast-money" operation and support accounts						
Military personnel	94.09	5.30	0.03	. . .	. . .	. . .
Operation and maintenance	74.28	19.85	2.65	. . .	. . .	. . .
Family housing	49.44	27.13	12.13	4.64	2.24	1.00
Aggregate for operation and support group[a]	82.87	13.31	1.64	0.10	0.05	0.02

Source: Department of Defense, *Financial Summary Tables, Department of Defense Budget for Fiscal Years 1988 and 1989* (DOD, 1987), tabs A, O. Aggregate outlay rates are developed using the procedure set forth in Joshua M. Epstein, *The 1987 Defense Budget* (Brookings, 1986), appendix.

a. If OMB's "other" category is included (see *Historical Tables*), and the military personnel outlay rate is applied, the rates in this row become 83.08, 13.16, 1.61, 0.10, 0.05, and 0.02.

Table 6. Defense Outlays If Budget Authority Were Zero for Fiscal Years 1988–92
Millions of dollars unless otherwise specified

Appropriation title	*1988*	*1989*	*1990*	*1991*	*1992*	*Five-year total*
Investment						
Procurement	70,175	42,654	18,695	6,555	1,065	139,144
Research, development, test, and evaluation	17,011	3,251	514	0	0	20,776
Military construction	4,435	2,383	1,180	486	189	8,673
Operation and support						
Military personnel	3,953	22	0	0	0	3,975
Operation and maintenance	17,800	2,111	0	0	0	19,911
Family housing	1,408	600	237	98	31	2,374
Other	415	96	25	0	0	536
Energy	3,511	668	105	0	0	4,284
Total	118,708	51,785	20,756	7,139	1,285	199,673
Investment as percent of total	77.2	93.2	98.2	98.6	97.6	84.4

Sources: Computed using budget authority data for fiscal 1983–87 from OMB, *Historical Tables, Fiscal Year 1988*, table 5.1, and outlay rates from Department of Defense, *Financial Summary Tables, Fiscal Years 1988 and 1989*, tab O. Each entry is obtained by applying to each appropriation title its outlay rates beginning in 1983 (the earliest year with an outlay impact on 1988) and letting the budget authority spend out, holding budget authority at zero from fiscal 1988 forward. Figures are for 050 and are rounded.

Table 7. The Overall Defense Budget Backlog, Fiscal Years 1988–92
Billions of dollars unless otherwise specified

Item	*1988*	*1989*	*1990*	*1991*	*1992*
Total outlays for year[a]	289.3	303.7	321.0	340.0	361.0
Outlays from current-year budget authority[b]	175.9	187.5	199.5	211.6	224.2
Outlays from prior-year budget authority[c]	113.4	116.2	121.5	128.4	136.8
Outlays from prior-year budget authority as percent of year's total outlays	39.2	38.3	37.9	37.8	37.9

a. These are defense budget outlays (051 account) estimated by OMB, *Historical Tables, Fiscal Year 1988*, pp. 3.3(4), 3.3(5).

b. Computed by multiplying each year's budget authority by the first-year aggregate spendout rate (the sum of the first year's spending for each appropriation title, divided by total budget authority found in OMB, *Historical Tables, Fiscal Year 1988*, pp. 5.1[2], 5.1[3]). This rate equals 0.58 for 1988 and, for simplicity's sake, is assumed to maintain that value through 1992. See appendix of Epstein, *The 1987 Defense Budget*, for a fuller discussion of aggregate outlay rates and their use.

c. Total outlays for year minus outlays from current-year budget authority.

Of course, in a new fiscal year total outlays will be the sum of all outlays resulting from budget authority granted in previous years, plus the first-year outlay from the new fiscal year's budget authority. The prior-year backlog, therefore, is simply the year's total outlays net of the first-year outlays from new budget authority. The prior-year backlogs implicit in the administration's multiyear plan are estimated in table 7. Again, because of investment decisions taken during the first six years of the administration, the backlog now represents nearly 40 percent of total outlays—a 50 percent increase over its 1981 value of about 26 percent, inherited from the Carter administration.[6]

This backlog is a matter of concern for the following reason. Barring rescissions of budget authority from earlier years—which would involve cancellation fees and other legal penalties—these prior-year outlays are locked in. Beyond this uncontrollable 40 percent of each year's outlays another 30 percent or so is needed simply to pay, house, and administer the defense establishment. Thus if large deficit reductions—that is, cuts in actual spending—are to be made in the current year, and the major capital projects, such as new strategic and naval programs, are protected from reductions, readiness—which has grown with the budget as a whole—is bound to suffer badly.

Large new investment programs, such as shipbuilding, should there-

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[6] The 1981 figure is from William W. Kaufmann, *A Reasonable Defense* (Brookings, 1986), p. 28.

Table 8. Obligation and Outlay Rates for Shipbuilding and Conversion, Fiscal Years 1988–93
Percent

Item	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*
Obligations[a]	55.40	16.70	6.40	4.40	17.10	. . .
Outlays[b]	5.99	17.00	20.00	21.00	15.00	10.00

Source: Department of Defense, *Financial Summary Tables, Fiscal Years 1988 and 1989*, tab O.
a. Percent of first-year budget authority obligated.
b. Percent of first-year budget authority spent.

fore not be undertaken lightly, since substantial multiyear contractual obligations will result. Money is locked into contract (obligated) long before it is actually spent (outlays), and the relationship is especially acute in the shipbuilding area (table 8).

Overcoming the resultant budgetary momentum is not easy. For example, if because of deficit reduction pressures Congress decided that *outlays* were to be frozen in real or nominal terms, substantial reductions in budget authority would be required. For example, assuming the current mix among appropriation titles, more than $300 billion would have to be cut from the administration's five-year budget authority plan to effect a nominal freeze on outlays (table 9). Again, the main contributor to the momentum—the bow wave—is investment spending.

While a nominal freeze on outlays would strike many as draconian, a real freeze on budget authority has considerable appeal on Capitol Hill. But depending on their composition, different real freezes on budget authority would have different implications for the deficit and, in the most general terms, for the defense posture of the United States. Any such freeze instituted by Congress would fall somewhere on the spectrum anchored at one end by an investment-intensive freeze and at the other by an O&S-intensive freeze. As further context—and as congressional reference points—these basic freezes (and one that takes a middle course) are worth a brief review before specific programs are discussed.

Three Generic Freezes

For lack of better terminology, I call the freezes investment intensive, O&S intensive, and across the board. Their respective outlay consequences are estimated in table 10.

Table 9. Budget Authority Reductions Required to Produce Real and Nominal Outlay Freezes, Fiscal Years 1988–92

Millions of dollars unless otherwise specified

		Real outlay freeze			*Nominal outlay freeze*		
Year	*Budget authority request*[a]	*Derived budget authority level*[b]	*Difference between request and derived level*	*Resulting real budget authority growth (percent)*	*Derived budget authority level*[b]	*Difference between request and derived level*	*Resulting real budget authority growth (percent)*
1988	311,967	304,590	7,377	0.6	281,962	30,005	−6.9
1989	332,364	323,285	9,081	2.5	290,397	41,967	−0.5
1990	353,463	336,398	17,065	0.7	292,080	61,383	−2.7
1991	374,979	349,117	25,862	0.7	294,019	80,960	−2.4
1992	396,907	357,136	39,771	−0.6	292,782	104,125	−3.2
Total reduction needed	. . .	. . .	99,155	. . .	. . .	318,439	. . .

a. See table 3; data are for 050.

b. The budget authority levels needed to make outlays conform to the specified growth tracks are calculated using the equations presented in the appendix of Epstein, *The 1987 Defense Budget*, and the following five-year aggregate outlay rates: 0.58, 0.22, 0.10, 0.04, and 0.02. The computation of these aggregate outlay rates uses outlay rates for each individual appropriation title, from Department of Defense, *Financial Summary Tables, Fiscal Years 1988 and 1989*, tab O. The calculation assumes no rescission of prior-year budget authority and no change in the mix among appropriation titles from the base year forward.

Predictably, a budget authority freeze in which the administration's O&S request is honored and investment is reduced accordingly (the investment-intensive freeze) would net smaller outlay savings in the near term than a budget authority freeze implemented by granting the administration's investment request and cutting operation and support. An across-the-board, or pro rata, freeze would generate outlay savings in between those of the other two.

The traditional preference of the military services in peacetime, a preference shared by the Reagan administration, has been to emphasize investment, expanding or modernizing the force (or both), and giving research and development (R&D) efforts a "head of budgetary steam" to ensure against an uncertain future. The impulse is to "get while the getting is good." "Technology," runs the argument, "is America's strength. In a crunch, people and readiness—the core of the O&S accounts—can be quickly obtained. If freeze we must, the O&S-intensive option is best."

One risk inherent in this approach is that the ability of U.S. military forces to deter aggression may weaken if tomorrow's big-ticket items are funded at the expense of today's combat effectiveness (a function of readiness, skill, sustainability, and other factors largely funded under

Table 10. Savings in Outlays from Alternative Real Freezes on Budget Authority, Fiscal Years 1988–92
Millions of dollars

Item	*Investment intensive*[a]	*Operation and support intensive*[b]	*Across the board*[c]
1988			
Cut in budget authority	8,924	8,924	8,924
Savings in outlays	2,350	7,414	5,176
1989			
Cut in budget authority	18,616	18,616	18,616
Savings in outlays	7,866	16,640	12,760
Two-year total			
Cut in budget authority	27,539	27,539	27,539
Savings in outlays	10,216	24,054	17,936
1990			
Cut in budget authority	29,080	29,080	29,080
Savings in outlays	15,651	26,753	21,854
1991			
Cut in budget authority	40,289	40,289	40,289
Savings in outlays	24,900	37,608	31,984
1992			
Cut in budget authority	52,411	52,411	52,411
Savings in outlays	35,242	49,336	43,093
Five-year total			
Cut in budget authority	149,319	149,319	149,319
Savings in outlays	86,008	137,751	114,867

Sources: Tables 3, 5, 9. Data are for 051.

a. Grant administration's operation and support request; cut investment by amount needed to freeze budget authority.

b. Grant administration's investment request; cut operation and support by amount needed to freeze budget authority.

c. Preserve current mix between investment and operation and support.

O&S). If the world is a volatile place, then perhaps the marginal dollar should be allocated to reduce immediate risk, by emphasizing readiness. Moreover, military modernization itself has called a basic premise of the O&S-intensive school into question: it is *not* clear that both readiness and appropriate people can be obtained quickly in a crisis. High technology requires high skill, and high skill cannot be acquired quickly.[7] Finally, insofar as investment is driven by a desire to hedge against

[7] On the topic of technology and manpower, see Martin Binkin, *Military Technology and Defense Manpower* (Brookings, 1986).

uncertainties regarding the future, there may be nonbudgetary ways of moderating them; for instance, through arms control.

In light of these points, some would conclude that a freeze would be better effected by granting the administration's O&S request and cutting investment accordingly (an investment-intensive freeze). Of course, the primary risk of a sustained investment-intensive freeze is that the West's technological lead may narrow.

A third way to freeze, similar to the well-known Gramm-Rudman-Hollings procedure, would be an across-the-board cut preserving the current mix among appropriation titles. Such a method of course would concede that the existing ratio of investment to O&S has been correct, an assumption not all would accept. Across-the-board freezes keep defective programs, "lemons," alive, while underfunding programs that deserve higher priority. Freezes that preserve service shares of the budget are equally suspect, as are most other rigid formulas.

Not only are all such procedures artificial, but any freeze proceeds from the assumption that the existing budget total is the correct one. Secretary of Defense Caspar W. Weinberger is right in admonishing that national security should not be held hostage to the federal deficit. If this were 1938, for example, a freeze would be inappropriate. How much should the United States spend and how should that expenditure be allocated among competing programs? As noted earlier, the only way to engage the question is to elaborate the ends one seeks to achieve and to gauge the adequacy and efficiency of the means available.

The main defense issues confronting Congress are discussed in the rest of this study.[8] Strategic forces are taken up first, then conventional forces, leading to a set of recommended adjustments to the defense budget. Like this year's defense budget request, my alternative budget is constructed on a two-year basis.

Strategic Forces

Until recently, the top-priority long-term goal of American strategic policy was unambiguous: the deterrence of nuclear attack on the United States, by threat of nuclear retaliation. On March 23, 1983, in his famous

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[8] The discussion is somewhat selective. For example, since no major adjustment in the U.S. capability toward South Korea is recommended (or proposed by the administration), no analysis is presented.

Star Wars speech, however, President Ronald Reagan presented a radically different goal: to make nuclear weapons "impotent and obsolete" through the development of strategic defenses.[9] Deterrence would be ultimately replaced by defense.

In deciding the future of the strategic defense initiative (SDI), including the fate of this year's request for a 57 percent increase in funding, it is useful to distinguish between the president's epochal vision—supplanting deterrence with *comprehensive* defense—and the more immediate, but no less controversial, objective of enhancing deterrence by deploying *partial* defenses.

Comprehensive Defense and the Replacement of Deterrence

Four years after the president's speech, basic questions remain unanswered concerning a comprehensive strategic defense (against Soviet ICBMs, bombers, cruise missiles, and submarine-launched ballistic missiles). First, at what price, if any, might such a defense prove feasible?

PRICE AND FEASIBILITY. Using assumptions that, on balance, are favorable to SDI—for instance, no growth in Soviet missile and bomber forces—Barry M. Blechman and Victor A. Utgoff have estimated the total investment and ten-year operating costs of a system to be fully operational in the year 2012, designed "to provide comprehensive defense against Soviet long-range missiles and aircraft, plus [the] option to defend against intermediate-range missiles." Their estimate is $770 billion at 1987 prices, with average annual expenditures of $44 billion during the peak ten years.[10] To place this estimate in perspective, $44 billion, for SDI alone, would exceed this year's entire budget request for research, development, test, and evaluation.

Under the current fiscal constraints, even these very optimistic estimates may constitute a robust deterrent to full congressional support. In reality, it is unlikely that a working system's true costs could be held to such levels. Specifically, the critical assumption of Soviet offensive restraint is implausible, especially now that SALT II has been abandoned. In 1985 Secretary of Defense Weinberger stated that "even a probable [Soviet] territorial defense . . . would require us to increase the number of our offensive forces."[11] Faced with an American deployment, the Soviets would have every incentive to do likewise; and the CIA has testified that it is well within their capability to double (to 21,000) their number of deployed warheads by the mid 1990s.[12]

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[9] "Address to the Nation, March 23, 1983," in *Weekly Compilation of Presidential Documents*, vol. 19 (GPO, 1983), p. 448.

[10] Barry M. Blechman and Victor A. Utgoff, *Fiscal and Economic Implications of Strategic Defenses*, SAIS Papers in International Affairs, no. 12 (Boulder, Colo.: Westview Press, 1986), p. 4.

Such expansion might permit the Soviets to overcome the system. But *saturation*—overwhelming (with greater numbers, more concentrated attacks, or higher salvo rates) the system's ability to weed out decoys and destroy targets—is only one possible counter to a strategic defense. *Evasion*, through deployment of fast-burn boosters, is another. The Defense Intelligence Agency has reportedly estimated that the Soviets could deploy such boosters by 1993.[13] *Suppression*, through direct mechanical destruction (with space mines) or blinding of critical components is yet another possible tactic.

In this connection the wisdom of pursuing antisatellite (ASAT) capabilities can be questioned, since the Soviets can be expected to respond in kind, developing ASATs that could jeopardize the critical space-based components of a ballistic missile defense. Indeed, an agreement limiting further development and testing of antisatellite weapons could prove critical to any future space-based defense.[14]

In short, the feasibility and, in turn, the price and affordability of any comprehensive strategic defense system would depend heavily on the adversary; it is unimaginable that either superpower would sit idly by and watch its deterrent be eroded. Lieutenant General James A. Abrahamson, the SDI's director, may have given a more accurate vision of the future when, during House testimony in 1986, he was asked whether he saw "the countermeasure and counter-countermeasure proceeding in the area and sphere of strategic space defense in the same manner we have seen it elsewhere?" He answered, "Yes."[15]

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[11] Cited in Leslie H. Gelb, "'Star Wars' Advances: The Plan vs. the Reality," *New York Times*, December 15, 1985.

[12] Statement of Lawrence K. Gershwin, National Intelligence Officer for Strategic Programs, CIA, *Soviet Strategic Force Developments*, Joint Hearing before the Subcommittee on Strategic and Theater Nuclear Forces of the Senate Committee on Armed Services and the Subcommittee on Defense of the Senate Committee on Appropriations, 99 Cong. 1 sess. (Government Printing Office, 1986), p. 14.

[13] Fred Kaplan, "Snag Seen for 'Star Wars' Defense," *Boston Globe*, February 3, 1986. See also Blechman and Utgoff, *Fiscal and Economic Implications*.

[14] For a comprehensive discussion of the ASAT question, see Paul B. Stares, *Space and National Security* (Brookings, 1987).

The course of such measure-countermeasure competitions is not predictable. Under certain assumptions, however, not even unlimited expenditures will guarantee an escape from the mutual hostage relationship that has so far characterized the nuclear era. Specifically, in an unconstrained U.S.-Soviet offensive and defensive arms race, each side would attempt to counter the adversary's defense by adding offensive forces, and to counter the other's offense by building defenses (as well as further offenses). Despite the deployment of strategic defenses capable of absorbing thousands of attacking warheads, neither side's security would necessarily improve. Rather, the arms races could cancel each other out, leaving warheads deliverable in first and second strikes literally unchanged. In short, an unfettered offense-defense arms race could amount to a monumentally expensive freeze on deliverable warheads, which of course are the only kind that matter.

DESIRABILITY. Even assuming comprehensive strategic defense to be feasible and affordable, many people question the desirability of a world in which nuclear weapons have been rendered "impotent and obsolete." Would conventional war be more likely in such a world? With remarkable prescience, Winston Churchill foresaw a world of mutual deterrence "where safety will be the sturdy child of terror, and survival the twin brother of annihilation."[16] It is hard to imagine conventional forces alone providing an equivalent to the nuclear terror—and hence, to nuclear deterrence.[17]

In some respects, however, it is only when such issues are swept aside that the most disturbing questions about comprehensive strategic defense arise. Assuming comprehensive strategic defense to be feasible, affordable, and desirable, is it safely attainable? Can the superpowers achieve it without encountering great strategic instability en route? Is a stable transition possible?

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[15] R. Jeffrey Smith, "Offensive Taken for Partial SDI Deployment," *Washington Post*, January 18, 1987.

[16] Speech before the House of Commons on March 1, 1955, *New York Times*, March 2, 1955.

[17] Moreover, if the "conventional spin-off" arguments advanced by the supporters of SDI are valid, conventional war in the defense-dominant world might be unprecedentedly destructive. Indeed, if it is destructive enough, one is hard put to see what would be gained by the elimination of deliverable nuclear arms.

THE TRANSITION PROBLEM. A strategic relationship is said to be crisis stable when neither side feels an incentive to preemptively attack the other in a crisis. One necessary condition for crisis stability is the mutual retention of invulnerable assured destruction capabilities, so that neither side can hope to escape unacceptable retaliatory damage by executing a first strike. If either side (or both) can eliminate the adversary's capacity to do socially mortal damage in a second strike, deterrence will be jeopardized, not enhanced.

The possible paths from a world of mutually assured destruction to the defense-dominant world of mutually assured survival are many. But among those characterized by competition—no sharing of defensive technology, no constraints on the deployment of defenses, and no synchronized constraints on or reductions in deliverable offensive capability—all encounter phases of crisis instability, points at which one or both sides develop such first-strike incentives.[18] That is also the problem with certain types of partial defenses, defenses incapable of handling an all-out first strike.

Partial Defense and the Enhancement of Deterrence

One can imagine many systems of less-than-comprehensive defense. But from a stability perspective it is critical to distinguish between a ground-based partial defense designed to protect only selected military installations, such as missile silos, by intercepting Soviet warheads after their reentry into the earth's atmosphere, and a space-based partial defense designed to attrit any Soviet attack, regardless of its targets, by picking off Soviet missiles in their boost phases, long before their destinations could be determined.

It is the latter type of defense that the Reagan administration and some members of Congress are pressing to deploy. The *deployment* of such a system would violate the 1972 Antiballistic Missile (ABM) Treaty. It would be more vulnerable to Soviet countermeasures than would ground-based terminal defenses, which, if sufficiently limited, need not violate the treaty. And of the two sorts of partial defense, the boost-phase intercept is potentially the more destabilizing. A ground-based terminal defense of U.S. silos would not jeopardize the Soviets' second-strike assured destruction capability. It could conceivably enhance the U.S. deterrent without degrading the Soviets'.[19] In contrast, a boost-phase defense would damage the Soviets' assured destruction capability, since it would destroy missiles aimed at cities as well as silos.

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[18] For stable transitions under highly cooperative regimes, see Jerome Bracken, *Stability, SDI, Air Defense and Deep Cuts* (Alexandria, Va.: Institute for Defense Analyses, 1986). See also Dean Wilkening and others, "Strategic Defenses and First-Strike Stability," *Survival*, vol. 29 (March–April 1987), pp. 137–65.

Ironically, therefore, capabilities such as space-based defenses designed to limit damage if deterrence fails can make deterrence failure, and great damage, more likely. In a crisis, a Soviet conviction that the United States was about to launch a first strike and had the capability to mop up the retaliation could produce powerful pressures to get in the first blow against U.S. ICBMs or command centers. It is virtually impossible to predict how U.S. and Soviet decisionmaking systems would interact in a severe crisis—for instance, after months of European conventional war, in which tens of thousands had already died, in which the sea-based (submarine) leg of the Soviet strategic triad had already been attacked, and in which remaining strategic forces on both sides had been brought to high levels of alert.[20]

Most analysts would agree that arms control and strategic force modernization are not ends in themselves but are means to certain ends, one being crisis stability. Clearly, if the restoration or maintenance of crisis stability requires the abrogation of arms control treaties, then their abrogation may be warranted. But to abrogate the ABM Treaty in order to deploy—at considerable expense—a potentially destabilizing partial defense is not reasonable. If deterrence requires enhancement at all—and it is far from clear that it does—there are certainly ways (discussed below) to enhance it without violating the treaty.

In summary, the logic of the current situation is this: comprehensive strategic defense does not appear to be a realistic goal, given the outstanding questions of technical feasibility, affordability, and the plausibility of a stable transition to mutually assured survival. Partial defenses would, at worst, prove destabilizing; at best, they could enhance deterrence. If in practice, then, the most that can be gained from SDI is an enhancement of deterrence, how much enhancement does deterrence require? Is the enhancement of deterrence a matter of great urgency? And if so, is partial defense the most efficient way to enhance it?

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[19] The U.S. deterrent would not necessarily be enhanced, however. If the Soviets were to respond with expanded terminal defenses of their own, the U.S. capacity to retaliate against certain classes of targets might be eroded and—to the extent that deterrence requires holding those currently undefended targets at risk—the U.S. deterrent could be eroded as well.

[20] See the relevant chapters in Ashton B. Carter, John D. Steinbruner, and Charles A. Zraket, eds., *Managing Nuclear Operations* (Brookings, 1987).

The Reagan administration and certain of its Democratic critics, in speaking of a window of vulnerability, have suggested that the enhancement of deterrence is urgent, that the retaliatory capabilities inherent in America's strategic offensive forces—the ICBMs, submarine-launched ballistic missiles, penetrating bombers, and cruise missiles—are wanting in deterrent power. This is a tough view to sustain. To see why, imagine the worst case.

CURRENT U.S. RETALIATORY CAPABILITY. Suppose the Soviets executed a "perfect" first strike, catching U.S. strategic forces on day-to-day alert, destroying all American ICBMs, 70 percent of U.S. bombers, and more than 50 percent of U.S. submarines. More than 4,100 warheads, capable of destroying a wide range of hard and soft Soviet targets in a second strike, would still be deliverable by the United States. Even assuming literally perfect Soviet air defenses against surviving U.S. bombers and cruise missiles, over 2,600 submarine-launched ballistic missile (SLBM) warheads would be deliverable in a U.S. second strike, more than enough to decimate hundreds of Soviet conventional and nuclear military targets, while holding in reserve enough destructive power to meet demanding criteria of assured destruction (table 11). No Midgetman missiles, no stealth bombers, no strategic defense initiative, no Trident II (D-5) submarine-launched ballistic missiles, none of America's roughly 5,000 theater nuclear weapons associated with NATO, and none of the nuclear weapons of Britain and France are included. These figures, in short, represent the very widest window of vulnerability that the most optimistic Soviet planner could possibly imagine. Perhaps it is understandable that the Soviets have not attempted to jump through.

In fact, prudent Soviet planners could not count on killing all U.S. ICBMs or on catching U.S. submarines and bombers on day-to-day alert. If the United States exploited the warning time that should be available during a conventional war or other crisis, the American bombers and submarines could be put on so-called generated alert. In that case, 80 percent of U.S. bombers and SLBMs could be available—more than 9,000 warheads—for a second strike, of which the United States would have high confidence of delivering over 6,900 (table 11). Of

Table 11. Effectiveness of a Soviet Strategic First Strike, Fiscal Year 1987

Item	*U.S. preattack strategic nuclear forces*			*U.S. strategic forces surviving if attacked on*					
				Day-to-day alert			*Generated alert*		
	ICBMs[a]	*SLBMs*[a]	*Bombers*[b]	*ICBMs*[c]	*SLBMs*[d]	*Bombers*[e]	*ICBMs*	*SLBMs*[f]	*Bombers*[f]
Launchers	1,000	640	353	260	373	106	260	512	282
Warheads	2,289	5,632	4,926	595	3,268	1,478	595	4,506	3,941
Deliverable in second strike	...	...	...	452	2,613	1,079	452	3,604	2,877
Assignment by target type									
Hard strategic[g]	...	...	...	363	...	731	363	...	1,948
Soft strategic	...	...	...	89	385	348	89	1,249	929
Peripheral attack	...	...	...	...	400	...	...	460	...
General purpose forces	...	...	...	...	400	...	...	460	...
Transportation	...	...	...	...	393	...	...	400	...
Power plants	...	...	...	...	100	...	...	100	...
Urban-industrial	...	...	...	...	935[h]	...	...	935[h]	...

Note: ICBM = intercontinental ballistic missile; SLBM = submarine-launched ballistic missile.

[a] Launcher data are from *Department of Defense Annual Report, Fiscal Year 1988*, p. 335; and U.S. Joint Chiefs of Staff, *United States Military Posture FY 1988*, p. 33. Warhead data are from International Institute for Strategic Studies, *The Military Balance 1986–1987* (London: IISS, 1986), pp. 200-01.

[b] Launcher data are from *Department of Defense Annual Report, Fiscal Year 1988*, p. 337; and JCS, *United States Military Posture FY 1988*, p. 33. Loadings for FB-111s, B-52G penetrators, and B-52H penetrators are from Congressional Budget Office, *Modernizing U.S. Strategic Offensive Forces: The Administration's Program and Alternatives* (GPO, 1983), p. 86; and Norman Black, "Pentagon Plans to Deploy 'Stealth' Cruise Missiles," *Washington Times*, January 7, 1987. Loadings for the B-1Bs and standoff variants are from IISS, *Military Balance 1986–1987*, p. 222.

[c] Surviving launchers are computed assuming the Soviet SS-18 mod 4 overall two-shot (cross-targeted) kill probability given in table 12. Surviving warheads are assumed to be distributed across surviving ICBM types according to their preattack proportions. Deliverable warheads are computed as follows: availability × reliability × number surviving = 0.95 × 0.80 × 595 = 452, using the availability figure from CBO, *Modernizing*, p. 84, and the reliability figure from CBO, *Counterforce Issues for the U.S. Strategic Nuclear Forces* (GPO, 1978), p. 18.

[d] Assumes day-to-day alert rates from CBO, *Counterforce Issues*, p. 26, of 55 and 65 percent for Poseidon and Trident, respectively, and generated alert rates of 80 percent for both. A reliability of 80 percent is applied to obtain deliverable warheads. CBO, *Retaliatory Issues for the U.S. Strategic Nuclear Forces* (GPO, 1978), p. 9.

[e] For launchers, this analysis uses the 30 percent alert rate given in CBO, *Modernizing*, p. 100. To compute surviving warheads, preattack loadings are multiplied by 0.3, then summed. On deliverable warheads, CBO estimates the compound probability of reliable operation and penetration of Soviet air defenses as between 70 percent and 76 percent; the average, 73 percent, is assumed. CBO, *Retaliatory Issues*, p. 9.

[f] For SLBMs and bombers the generated alert rate of 80 percent from CBO, *Counterforce Issues*, pp. 26, 28, is assumed, even though a 95 percent rate is given in CBO, *Modernizing*, pp. 100, 103–04. Surviving and deliverable warheads are computed as above, with 73 percent deliverable for bombers and 80 percent (reliability) deliverable for SLBMs.

[g] MX, Minuteman III and IIIA, air-launched cruise missiles (ALCMs), and gravity bombs are assigned to hard targets; Minuteman II, short-range attack missiles (SRAMs), and SLBM warheads are allocated to other targets.

[h] Two hundred equivalent megatons (EMT) at 0.1 megaton per warhead.

these, roughly 3,600 would be SLBM warheads. According to the CIA, "The Soviets still lack effective means to locate United States ballistic missile submarines at sea. . . . we do *not* believe there is *a realistic possibility* that the Soviets will be able to deploy in the 1990s a system that could pose *any significant threat* to United States SSBN's [nuclear ballistic missile submarines] on patrol."[21]

The window narrows further when one considers that the United States could—technically—launch its ICBMs on warning of a Soviet attack, adding roughly 1,800 warheads to the retaliatory blow suffered by the USSR.[22] Though launch-on-warning is an extremely hazardous doctrine, no prudent Soviet planner can ignore the possibility. This uncertainty contributes to deterrence. Aside from the many uncertainties associated with U.S. operational behavior, the Soviets also face technical uncertainties.[23] Finally, even assuming these are overcome and Soviet ICBMs perform as well as currently estimated (table 12), and that the United States chooses to ride out the Soviet attack, the prevailing assumption that the American ICBM force would be wiped out is simply not supported by the available evidence. Rather, about 25 percent of the launchers and roughly 26 percent of the warheads (more than 500) would survive. This finding, moreover, is consistent with the congressional testimony of CIA officials responsible for the analysis of Soviet capability.[24]

All told, a conservative Soviet planner today would have to bank on an overall American retaliatory capability of some 6,900 warheads. It is difficult to fathom how that deterrent should call for enhancement, either through partial strategic defenses or other means, such as deploying 500

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[21] Statement of Gershwin, *Soviet Strategic Force Developments*, Hearing, p. 17. Emphasis added.

[22] This assumes a reliability of .8. See note c of table 11.

[23] See, for example, Bruce W. Bennett, *How to Assess the Survivability of U.S. ICBMs*, R-2577-FF (Santa Monica, Calif.: Rand Corp., 1980).

[24] "The Soviet capability today against Minuteman silos is substantial but not perfect by any means. . . . It is certainly not our intention to create the impression that the Soviets today could destroy all Minuteman silos, period. They could do a pretty good job against them." Lawrence K. Gershwin, quoted in Michael R. Gordon, "CIA Downgrades Estimate of Soviet SS-19 . . . Saying Missile Too Inaccurate for First Strike," *National Journal*, vol. 17 (July 20, 1985), p. 1693. More recently, the Department of Defense itself has estimated that "20 percent to 35 percent of the silos would survive" an attack by SS-18 mod 4 missiles. Congressional Budget Office, *Trident II Missiles: Capability, Costs, and Alternatives* (GPO, 1986), p. 15. Further details can be found in Department of Defense, *Soviet Military Power, 1986*, 5th ed. (GPO, 1986), p. 25.

Table 12. Assumed Soviet ICBM Performance in Two-on-One Attacks against U.S. Silos of 2,000-Psi Hardness[a]

Soviet ICBM	*Accuracy of attacking warhead (CEP, in nautical miles)*[b]	*Explosive yield (megatons)*[c]	*Overall two-shot kill probability*[d]
SS-18 mod 4	0.135	0.50	0.74
SS-19 mod 3	0.150	0.55	0.70
1985 CIA reestimate	0.216	0.55	0.46

a. Assumes Soviets allocate two warheads per U.S. silo. U.S. silo hardness of 2,000 pounds per square inch (psi) is from CBO, *Modernizing*, p. 84.

b. Circular error probable (CEP) is the radius of a circle within which the warhead has a 50 percent probability of landing. CEP for the SS-18 mod 4 is from IISS, *The Military Balance 1985–1986*, p. 162; for the SS-19 mod 3, I assume the SS-19 follow-on estimate from CBO, *Modernizing*, p. 90; this imputes to the SS-19 mod 3 higher accuracy than is given it specifically (0.162 nautical miles) in IISS, *Military Balance 1985–1986*, p. 162. The CIA reestimated the SS-19 mod 3's accuracy downward in 1985. The figure is from Michael R. Gordon, "CIA Downgrades Estimate of SS-19 . . . Saying Missile Too Inaccurate for First Strike," *National Journal*, vol. 17 (July 20, 1985), p. 1692.

c. Yields are from IISS, *Military Balance 1985–1986*, p. 181.

d. Computed as $1 - (1 - TPK)^2$, where the terminal kill probability, *TPK*, equals the product of a weapon's reliability and single-shot kill probability, *SSPK*. $SSPK = 1 - 0.5^{(LR/CEP)^2}$, where the lethal radius, *LR*, is computed as a function of warhead yield and target hardness using the first formula given by Lynn Etheridge Davis and Warner R. Schilling, "All You Ever Wanted to Know about MIRV and ICBM Calculations but Were Not Cleared to Ask," *Journal of Conflict Resolution*, vol. 17 (June 1973), p. 213. The algorithm credits the Soviets with perfect cross-targeting so that reliability is maximized over the attack. Overall reliabilities of 80 percent are assumed, higher than the value of 75 percent given in CBO, *Counterforce Issues*, p. 16.

of the single-warhead mobile ICBMs known as Midgetman, a weapon that gained bipartisan support when proposed by the President's Commission on Strategic Forces (the Scowcroft Commission) in 1983.[25]

Given existing and programmed (see discussion below) U.S. retaliatory capabilities, the stability arguments for Midgetman ring hollow. It is hard to believe that the Soviets' inclination to launch a first strike against the United States would be at all sensitive to the addition of 500 more ICBM warheads to the U.S. inventory. Nor (regarding single- versus multiple-warhead missiles) is it clear why the Soviets would be perceptibly *more tempted* to attack the same marginal 500 warheads if they were deployed on 50 MX missiles (at 10 warheads apiece) *than if* they were deployed on 500 single-warhead Midgetman missiles. Why should the Soviets be tempted to attack either force, or for that matter, current forces? Before the United States spends $45 billion on Midgetman, these questions and others raised below deserve serious answers. For example, Midgetman missiles will have excellent hard-target kill capabilities; why is it "stabilizing" for the United States to procure any more counterforce weaponry than is already programmed?

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[25] *Report of the President's Commission on Strategic Forces* [The Scowcroft Commission], April 1983, pp. 15–16.

Table 13. Programmed U.S. First- and Second-Strike Prompt Hard-Target Kill Capability, with No Midgetman and 50 MX Missiles

		First strike		*Second strike*	
System	*Two-shot kill probability*	*Maximum number of targets attacked*	*Expected targets destroyed*	*Maximum number of targets attacked*	*Expected targets destroyed*
Trident II Mark 5	0.86	2,400	2,064	1,920	1,651
1 MX plus 1 MMIIIA[a]	0.86	500	430	130	112
Total	...	...	2,494	...	1,763

Source: CBO, *Trident II Missiles*, pp. 10, 51-3, and table 11. CBO assumes Soviet targets of 5,000 psi hardness, U.S. missile reliabilities of .8, and single-shot kill probabilities of 79 percent for Trident II Mark 5, 93 percent for MX, and 57 percent for MMIIIA.

a. Minuteman III Mark 12A.

THE SOVIET WINDOW OF VULNERABILITY. Indeed, not only are U.S. second-strike capabilities programmed to grow, but—with the planned deployment of 50 MX and 20 Trident submarines, equipped with Trident II missiles—the United States will acquire a much better first-strike capability against Soviet ICBMs (which hold over 60 percent of Soviet warheads) than the Soviets have ever had against U.S. ICBMs (which account for only about 20 percent of U.S. warheads).

According to the Congressional Budget Office, "by the year 2000 when 20 Trident submarines would be deployed under the Administration's plan, the U.S. inventory of hard-target warheads on ballistic missiles would have grown to approximately 6,800, including 4,800 warheads on Trident II SLBMs, and at least 500 warheads on MX ICBMs."[26] From the current U.S. inventory of 1,650 hard-target warheads—all of them far less capable than Trident IIs—deployed on ballistic missiles, this represents a literal quadrupling. It "would transform the ability of the United States to conduct large-scale attacks on hardened targets in the Soviet Union."[27] Against the very hardest of Soviet targets, such as ICBM silos, the U.S. force will have the imposing first- and second-strike capabilities shown in table 13.

Clearly, all the Soviets' current 1,398 ICBM silos would be at extreme risk, which is one reason why the Soviets are moving to mobile missiles (and is also why the American offer of November 1985 at the Geneva conference to ban mobile missiles was not universally regarded as realistic). Indeed, the number of fixed Soviet silos is projected to fall to about 900 by the time the Trident program is complete.

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[26] Congressional Budget Office, *Trident II Missiles*, p. 4.

[27] Ibid., p. xi.

If the Soviets are evacuating fixed silos in favor of mobility, why should the U.S. invest heavily in weapons—such as Midgetman and further MX missiles—that are optimized only against *fixed* hard targets, especially when that (shrinking) target set will already be well covered? Indeed, without any Midgetman missiles, and holding the MX force to 50, the U.S. capability against Soviet ICBM silos and hardened strategic command and control bunkers will make the American "window of vulnerability" look rather modest. This leaves aside the first-strike potential inherent in the Pershing II missile force.

Moreover, though it is seldom noted, stealth weaponry (the advanced technology bomber and advanced cruise missile) may also pose a first-strike threat, and not merely because of yield and high accuracy, though the combination promises to be potent. Rather, there is a widespread, and questionable, presumption that the only first-strike weapons are the fast-flying, "prompt," hard-target killers, the ballistic missiles. Speaking precisely, however, it is not their short flight times (their literal promptness) that make ballistic missiles first-strike counterforce weapons. Rather, it is the limited reaction time their speedy delivery would afford the Soviets. In practice, however, an undetected attack by slow-flying stealth cruise missiles (and bombers) could give the Soviets even less reaction time than an attack by faster flying, but more easily detected, ballistic missiles. (For this reason, a ban on all ballistic missiles, as proposed in 1986 at the U.S.-Soviet summit meeting in Reykjavik, might not, in fact, increase stability, since in a world of stealth cruise missiles, reciprocal fears of surprise attack might actually grow!)

In any event, the advocates of the $45 billion Midgetman ICBM, and of further MX missiles, have yet to make a case that the United States needs prompt first- or second-strike hard-target kill capabilities beyond those to be provided by the Trident IIs, 50 MXs, and the Minuteman IIIA force. Some would hold that the first-strike capabilities programmed are already excessive and potentially destabilizing, or will become so if and when augmented by strategic defenses.

Sometimes an "astrategic" argument for Midgetman is advanced—namely, that because of age the Minuteman ICBM force will require routine replacement in the near future. First, even if it were true that the Minuteman III force required routine replacement, it would not follow that Midgetman specifically would be required, given the alternatives (including a new three-warhead Minuteman). And, in fact, Minuteman does not require routine replacement. At a cost of billions of dollars, the Minuteman's motors and other critical subsystems have been modernized; practically speaking, the Minuteman IIIA is a new missile. Moreover, the 50 Minuteman missiles removed from their silos to make room for the 50 silo-based MX missiles that are planned will permit six to ten years of Minuteman reliability testing (at eight firings a year in the first case and five in the second), to ensure that the force stays in top condition.

SURVIVABILITY OF MOBILE MISSILES WITHOUT SALT II. Not only would mobile Midgetmen and rail-mobile MX be unnecessary as routine replacements, and superfluous from a target-coverage standpoint, if not outright destabilizing, but their survivability itself is dubious. Unconstrained by SALT II, or comparable limits on strategic offensive forces, the Soviets, according to the CIA, could increase their strategic warheads from the current total of about 10,000 to between 16,000 and 21,000 by the mid-1990s. Even the higher number, the CIA says, "is not a maximum effort," which could bring the total to nearly 28,000.[28]

At such levels of Soviet strategic offense, schemes to enhance ICBM survivability by deploying them on mobile launchers are unlikely to succeed. As shown in table 14, the Soviets would be able to (1) barrage a force of 500 Midgetman missiles dispersed, on hard mobile launchers, over the 17,000 square nautical miles of southwestern territory owned by the Departments of Defense and Energy; (2) barrage a force of 50 MX missiles deployed as contemplated on 18,250 miles of commercial railroad track; (3) cover 1,000 ICBM silos at two warheads per silo; and (4) accomplish a broad spectrum of further countermilitary tasks, while withholding all the warheads required to promptly obliterate over 50 percent of America's urban population.[29] By contrast, if the Soviets were constrained to levels of strategic offense permitted under SALT II, they would fall short of those targeting goals by more than 6,000 warheads.

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[28] The CIA data and quotation are from Gershwin, *Soviet Strategic Force Developments*, Hearing, p. 14. The figure of 28,000 is a Congressional Research Service estimate of a "rapid expansion" but not a "crash program." See Al Tinajero and others, *U.S./Soviet Strategic Nuclear Forces: Potential Trends with or without SALT*, Library of Congress, Congressional Research Service, Report 84-174 F (CRS, 1984), pp. 24, 34.

[29] This calculation is optimistic, moreover, in assuming that the rail-mobile MX is not caught in its garrisons by a bolt-from-the-blue attack. Far fewer Soviet warheads would be required to destroy the force in its garrisons.

Table 14. Mid-1990s Soviet Warhead Demand and Supply with and without SALT II Limits

Mission	*Number*	*Warheads per target*	*Delivered warheads required*
90 percent damage expectancy against rail-mobile MX	. . .	. . .	5,680[a]
90 percent damage expectancy against area-mobile small ICBM (Midgetman)	. . .	. . .	7,650
Cross-target 1,000 ICBM silos at 2:1	. . .	. . .	2,000
Subtotal	. . .	. . .	**15,330**
Cover Strategic Air Command (SAC) bomber and tanker bases	34	15	510
Cover nuclear Navy bases	16	2	32
Cover nuclear weapons storage facilities	9	2	18
Cover missile launch control centers	100	2	200
Cover national command posts and alternative headquarters	7	1 + 1(at 5)	12
Cover early warning radars	5	1	5
Cover Navy radio transmitters	10	1	10
Cover SAC radio transmitters	9	1 + 1(at 2)	11
Cover satellite command transmitters	9	1	9
Subtotal[b]	. . .	. . .	**807**
Deliver 200 equivalent megatons (at 0.5 megaton per warhead)	. . .	. . .	**317**
Total warheads delivered	. . .	. . .	**16,454**
Peacetime demand (at overall reliability of 0.8)	. . .	. . .	20,568
Peacetime supply (without SALT and maximum rates)[c]	. . .	. . .	27,798[d]
Peacetime supply (with SALT limits)[c]	. . .	. . .	14,214[e]

a. Barrage requirements for rail-mobile MX and area-mobile Midgetman are derived as follows. For MX, a line barrage is required. The number of warheads, N, required to barrage a line of distance, d, with a packing factor of f and damage expectancy of D is given by $N = dfD / 2R$, where R is the lethal radius of the attacking warheads (expressed in the same units as distance). To barrage an area of A square units, with f, d, D, and R as defined above, $N = AfD / \pi R^2$.

For targets of hardness p (psi), the lethal radius R (in meters) of a weapon of yield Y_{KT}, detonated at its *optimal* height of burst, is (in meters):

$$R(Y_{KT})_m = Y_{KT}^{1/3} \cdot \begin{cases} 2224\,p^{-.744} \text{ if } 1 \le p < 10 \\ 1685\,p^{-.620} \text{ if } 10 \le p < 100 \\ 384\,p^{-.296} \text{ if } 100 \le p < 10{,}000 \\ 318\,p^{-.273} \text{ if } p \ge 10{,}000 \end{cases}$$

This formula was obtained by curve fitting the overpressure results of Harold L. Brode and Stephen J. Speicher, *Air Blast from Nuclear Bursts—Analytic Approximations*, prepared for the Defense Nuclear Agency (Los Angeles: Pacific-Sierra Research Corp., 1985).

The results in the table are obtained assuming 500 KT Soviet warheads, damage expectancies of 90 percent, packing factors of 1.2, hardnesses of 30 psi for Midgetman and 12.5 psi for MX, 17,000 square nautical miles as the deployment area for Midgetman, and 18,250 miles as the rail distance for MX. The last value is from General Accounting Office, *ICBM Modernization: Status, Survivable Basing Issues, and Need to Reestablish a National Consensus*, GAO NSIAD-86-200 (GAO, 1986), p. 53. The use of 12.5 psi for rail-mobile MX is assumed to be favorable to the system based on the survivability record given in Samuel Glasstone and Philip T. Dolan, eds., *The Effects of Nuclear Weapons*, 3d ed. (Department of Defense and Department of Energy, 1977), pp. 192–93.

b. The source for this group is William Daugherty, Barbara Levi, and Frank von Hippel, "The Consequences of 'Limited' Nuclear Attacks on the United States," *International Security*, vol. 10 (Spring 1986), p. 30.

c. Soviet capacities are from Al Tinajero and others, *U.S./Soviet Strategic Nuclear Forces: Potential Trends with or without SALT*, Library of Congress, Congressional Research Service, Report 84-174F (CRS, 1984), p. xii.

d. 7,230 surplus.

e. 6,354 deficit.

Here the policies of the Reagan administration conflict. It has abandoned SALT II, removing all constraints on Soviet offensive force levels, but is planning to deploy mobile ICBMs whose survival requires precisely that Soviet offensive forces be capped.

In fact, without arms control, mobile missiles play to the Soviets' strength: sheer quantitative force growth. The superhardening of U.S. silos would at least require that the Soviets improve their force qualitatively, by greatly increasing its accuracy. All else fixed, to achieve against 50,000 psi silos the same two-shot kill probability of 74 percent they now enjoy against 2,000 psi silos, the Soviets' accuracy (SS-18 mod 4) would have to triple (that is, fall from 0.135 naut. mi. CEP [circular error probable] to 0.045 naut. mi. CEP). This would pose a real technological challenge to the Russians and could prolong the life of the U.S. ICBM force.[30]

Clearly, hardening silos is not the only alternative to Midgetman, or rail-mobile MX missiles, as a way to enhance deterrence *if* that is deemed essential. Other possibilities are deep underground basing of ICBMs plus upgraded command and control to submarines (if necessary), increases in submarine force levels, or further procurement of sea- or air-launched cruise missiles. The last of these bears on the future of the bomber.

MANNED BOMBERS. The basic question here is sometimes forgotten. In how many ways must the United States be able to penetrate Soviet air defenses with bombers and cruise missiles? The B-52 bomber (which is further equipped with its own nuclear-armed defense-suppression

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[30] If superhardening were combined with deceptive basing—multiple empty silos for each full one—even more time could be purchased. If the only goal of Midgetman, moreover, is to raise the Russians' "price to attack" (in warheads expended in an attack), there are other ways to do it without buying more counterforce capability. For instance, it has not been shown that deceptive basing, combined with preferential terminal defense, would not exact comparable prices. On such defenses, Kenneth Flamm and I have proved the following theorem. Let W be the minimum number of (perfect) warheads an attacker must send against an M-missile complex preferentially defended by D (perfect) interceptors in order to be certain that no more than S missiles survive. Then

$$W = \left(\frac{D}{S+1} + 1\right) M.$$

If there are F fake (that is, empty) silos, in addition to M full ones,

$$W = \left(\frac{D}{S+1} + 1\right) (M + F).$$

missile) can penetrate Soviet air defenses through corridors cut for it by submarine-launched ballistic missiles. Using the same tactic, or using its low radar profile, active electronic countermeasures, and nuclear short-range attack missile to shoot its way in, the B-1 bomber will provide higher confidence of penetration. Air-launched cruise missiles released by B-52s (or B-1s) from outside of Soviet airspace, or cruise missiles launched from sea (the nuclear Tomahawk land-attack missile, TLAM/N), provide yet other, very high confidence means of nuclear strike. In fact, in the CIA's estimation, "against a combined attack of penetrating bombers and cruise missiles, Soviet air defenses during the next 10 years probably would not be capable of inflicting sufficient losses to prevent large-scale damage to the USSR."[31]

Looking to the future, the application of stealth technology to cruise missiles, as envisioned in the advanced cruise missile (ACM) program, promises to increase further the already high confidence the United States enjoys. But though stealth technology, applied to cruise missiles and importantly to conventional forces, deserves strong support, the case for the stealth manned penetrating strategic bomber (also called the ATB, for advanced technology bomber) has yet to be made, given the existing means of penetrating Soviet airspace, and particularly given the stealth bomber's projected costs, which have been estimated to total nearly $26 billion for 1983 through 1990.[32]

Conclusions

Although the theoretical vulnerability of America's land-based ICBM force is a matter of long-term concern, there is time to bring U.S. arms

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[31] Statement of Gershwin, *Soviet Strategic Force Developments*, Hearing, p. 17.

[32] Estimate from Joseph F. Campbell, "Stealth Bomber: Program on Track, Growth for Northrop," Paine Webber Status Report, February 13, 1986, p. 3. Campbell's figure is $25,905 million for 1983–90. Moreover, even if, having driven the Soviets out of fixed silos, the United States now wishes to chase down and attack their mobile ICBMs as they roam the Russian steppe, it still does not follow that the stealth bomber is necessarily the appropriate weapon system. Will it have the range, payload, and reliability to do the job? Ironically, the B-1's well-publicized problems (see note 2), like some other procurement "horror stories," are at least partly the result of the emergency mentality produced by an exaggerated threat assessment. "We're in desperate straits; get everything yesterday. Don't worry about concurrency or production cost." Since the United States can penetrate Soviet airspace in a variety of ways, it can surely afford to subject the stealth bomber to greater scrutiny, ensuring at least that if a legitimate mission for manned penetrators is identified, the United States will have a plane that can reliably execute it.

Table 15. Proposed Alterations to the Administration's Strategic Nuclear Plan, Fiscal Years 1988–89
Billions of dollars

		Budget authority (050) savings	
Program	*Action*	*1988*	*1989*
Small ICBM (Midgetman)	Cancel	2.3	2.3
MX missile	Cap at 50; reduce test procurement for 50 deployed; eschew rail-mobile option	0.9	1.6
Strategic defense initiative (DOD)	Freeze at fiscal 1986 level	2.5	3.5
Strategic defense initiative (DOE)	Freeze at fiscal 1986 level	0.2	0.0
Antisatellite (ASAT) program	Cancel	0.4	0.8
Advanced technology bomber (ATB)	Hold in reduced development	2.0	2.0
Total savings in budget authority	. . .	8.3	10.2
Resulting savings in outlays	. . .	(2.2)	(5.4)

Sources: Department of Defense, *Program Acquisition Costs by Weapon System, Fiscal Years 1988 and 1989*, pp. 78, 83, 136, 148, and *Fiscal Year 1987*, p. 177; Center on Budget and Policy Priorities, Defense Budget Project, "Factsheet on the Strategic Defense Initiative Budget," January 14, 1987; Congressional Budget Office, "The MX Missile Test Program and Alternatives," staff working paper (February 1986); and Federation of American Scientists.

control policies and strategic modernization programs into sync, to make reasoned choices among the many competing modernization alternatives, and to set a balanced and stabilizing course for the rest of the century at least. Because of the special dynamics of defense spending that were noted at the outset, and the way in which budgetary (and hence, political) momentum can build, the first step is to avoid getting locked into programs—especially defensive ones—before their necessity and efficiency have been established. The adjustments proposed in table 15 reflect that view.

The Midgetman missile would be cancelled and the deployed MX force capped at 50. Rail-mobile basing for MX would be eschewed. Growth rates in funding for SDI and the stealth bomber would be reduced and new funding for antisatellite weaponry denied.

For the strategic forces, the essential question is whether the enhancement of deterrence is an urgent matter calling for the rapid and simultaneous modernization of all legs of the strategic offensive triad—including two new bombers, two new ICBMs, both stealth and nonstealth cruise missiles, new Trident submarines and Trident II hard-target killing missiles—plus vigorous prosecution of ASAT capabilities and the earliest possible deployment of a partial boost-phase defense that would violate the ABM Treaty, the SALT II accord having already been discarded.

As has been argued, a powerful case can be made that the answer is no, that deterrence is robust, and that, given the existing means of performing basic tasks, some of the administration's programs—duplicative air breathing systems and mobile ICBMs—are superfluous. Moreover, even if the enhancement of deterrence were urgent, it would not follow that the administration's policies constitute either the most economically efficient or politically prudent way to enhance it.

Conventional Forces

The most plausible paths to nuclear war begin with a failure of conventional defenses. For that reason, and because nonnuclear forces account for roughly 80 percent of the defense budget, conventional requirements must be assessed rigorously, by methods that go beyond the side-by-side comparison of peacetime inventories to capture the technological, geographic, and operational factors that often matter most. Nowhere has the failure to appreciate such factors been more systematic, or proved more pernicious, than in the Persian Gulf.

The Persian Gulf

The Soviet military threat to this region has been a prime security concern of the United States since the 1940s. Since the fall of the shah and the invasion of Afghanistan, the Soviet threat to Iran specifically has been the basis for America's rapid deployment force planning. This contingency accounts for the bulk of U.S. defense spending on Southwest Asia: the case for creating a new unified command—U.S. Central Command—and for the Reagan administration's plans to vastly expand the force were both couched primarily in terms of the Soviet threat.[33]

Most recently, of course, President Reagan and other administration officials have sought to justify their secret arms deal with Iran by reference to the Soviet threat. In December 1986 former national security adviser Robert McFarlane called a Soviet invasion of Iran "more than conceivable if you have examined Soviet exercises conducted in recent years."[34]

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[33] The Carter administration created the Rapid Deployment Joint Task Force (RDJTF) in 1980 to strengthen America's military posture in the Gulf. On January 1, 1983, the RDJTF was upgraded and converted to a new unified command, the U.S. Central Command (CENTCOM). At the time the force comprised about 220,000 personnel. That figure, and the Reagan administration's plans for a force totaling 440,000 personnel, are set forth in Congressional Budget Office, *Rapid Deployment Forces: Policy and Budgetary Implications* (CBO, 1983), p. xv.

In short, the specter of Russian divisions plunging south for the warm water ports and oil fields of the Persian Gulf has been central in shaping the administration's policy toward the region, including its secret arms deals with Iran. The administration, however, has badly exaggerated the Soviet threat to that country.

Because of Iran's forbidding terrain, and the vast distances and limited transportation system between Russia and the Gulf, a Soviet invasion would be fraught with serious vulnerabilities. Remarkably, these vulnerabilities have been explicitly recognized in formerly top-secret planning documents of the U.S. Joint Chiefs of Staff and in an invasion plan written by the Soviet General Staff itself.

If these vulnerabilities were exploited, an American rapid deployment force considerably smaller than that approved by the Reagan administration could mount a successful conventional defense and present an imposing deterrent to Soviet aggression. Units beyond those needed to defend the Persian Gulf could be reallocated to NATO, where ground forces deserve greater attention, naval and air forces having been the main beneficiaries of the Reagan buildup.

To gauge requirements in the Persian Gulf, certain operational realities must be appreciated. Terrain is first among these. Two formidable mountain ranges stand between the USSR and Iran's oil fields: the Elburz mountains in the north and the Zagros mountains further south (figure 3). By road, the distance from Soviet bases to the oil is more than 1,000 kilometers. The transportation system over these mountains is exceedingly limited—a dozen arteries over the Elburz, narrowing to six over the Zagros, including one railroad. This sparse system is dotted with severe choke points, places where the destruction of bridges or tunnels would bring entire Soviet columns to a standstill.

All these facts are well known to American and Soviet military planners, and have been for decades. For instance, the Soviets' own *Command Study of Iran* repeatedly notes "narrow gorges which can be easily blocked."[35] Similarly, in once top-secret studies the American

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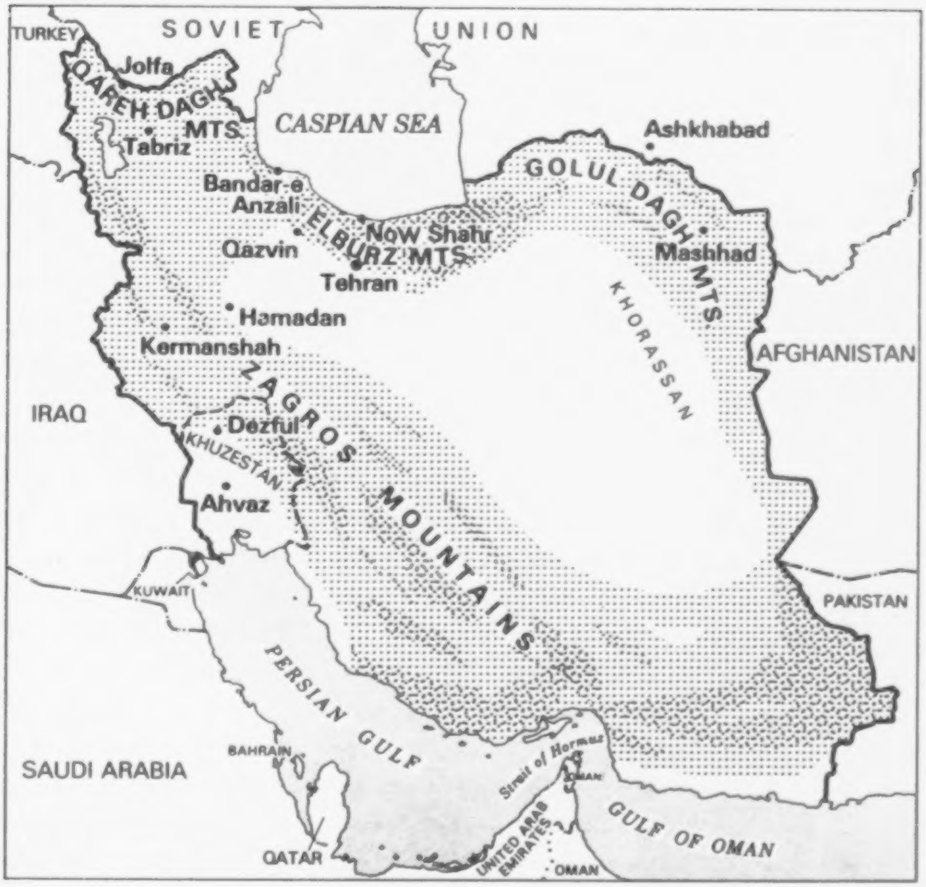
[34] Michael R. Gordon, "1980 Soviet Test: How to Invade Iran," *New York Times*, December 15, 1986.

[35] Gerold Guensberg, trans., *Soviet Command Study of Iran* (Moscow, 1941), p. 220

Figure 3. Iran



military concluded that "Soviet offensive forces will be limited by their dependence on long overland lines of communication readily harassed by guerrilla or commando type operations and *ideally suited to interdiction* by Allied air."[36]

My own estimate, based on detailed calculations,[37] is that two wings of F-111s (one of the types of aircraft that bombed Libya) could create four to six serious choke points on each of the arteries (road and rail) from the USSR to Tehran in one day of high-intensity flying. This would impose considerable delay on a Soviet drive for oil.

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[36] Joint Strategic Plans Group, "Proposed Guidance for an Alternative Plan to 'Bushwacker,'" March 8, 1948, p. 130. Emphasis added.

[37] See Joshua M. Epstein, *Strategy and Force Planning: The Case of the Persian Gulf* (Brookings, 1987), pp. 107–11.

U.S. special operations forces working in the southern, Zagros, mountains could further attrit and delay the Soviets' advance south. Regarding the countless gorges through the Zagros, the Soviets themselves wrote, "with the use of obstacles or roadblocks these can be turned into excellent defensive positions," a view in which Pentagon planners (in a 1979 study) entirely concurred.[38]

The point of these operations would again be to delay and wear down a Soviet invasion long enough to insert an adequate defensive force in the oil region of the south. What is an adequate force? Detailed analyses of ground combat dynamics indicate that a force of 5 U.S. divisions plus 6 wings of close air support is adequate to contend with the force the Soviets could sustain (logistically) in combat this far from their border.[39]

A force of that size is more efficient than the force of 7⅓ divisions approved by the Reagan administration, the main difference being the presence in the second case of two superfluous light divisions. The highest U.S. priority should be to increase the speed of the force, through increased sealift, not its size. Any U.S. response timely enough to make 7⅓ divisions effective is timely enough to make 5 divisions sufficient.[40]

Two of the Army light divisions available to the U.S. Central Command (roughly 10,000 men each) should be disbanded; the personnel should be retained and reorganized as two independent brigades outfitted with tanks (for example, M60A3s) and other stockpiled heavy equipment appropriate for armored warfare in Europe. In the event of war, these brigades could be rounded out with existing National Guard or Reserve forces to form an additional division equivalent for NATO.[41]

These recommendations—which include increased fast sealift over acquisition of the C-17 aircraft—are among the conventional force adjustments set forth in table 20. While increasing the efficiency of the U.S. conventional deterrent in the Persian Gulf, these changes would also enhance NATO's strength.

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[38] Guensburg, trans., *Soviet Command Study*, p. 190; and Capt. Henry Leonard and Jeffrey Scott, "Methodology for Estimating Movement Rates of Ground Forces in Mountainous Terrain with and without Defensive Obstacles," p. 4.1.

[39] Epstein, *Strategy and Force Planning*, pp. 44–97, and case 2A of appendix D, pp. 126–45.

[40] Ibid., pp. 84–85.

[41] Savings from the discontinuation of military construction activities associated with the light division at Fort Drum might be used to procure additional fast sealift for this newly created division for NATO.

NATO and the Warsaw Pact

While differing from the administration's plan, my recommendation to disband Gulf-oriented light divisions in favor of a NATO-oriented heavy one stands diametrically opposed to the recent proposals by several prominent Americans to withdraw substantial numbers of U.S. forces from Europe. For example, former national security adviser Zbigniew Brzezinski has suggested withdrawing 100,000 U.S. troops from Europe and converting them to light divisions for an expanded rapid deployment force. "*Manpower withdrawn from Europe should be absorbed into an enlarged Rapid Deployment Force* through the creation of additional light divisions."[42] Not only would this action reduce what is essential (NATO's current force) to expand what is superfluous (the Army's light divisions), but it would probably increase costs (for example, housing and associated military construction in the United States) rather than save money. Of course, a hope is that the allies would fill the gap. But, as a political signal, it risks the counterproductive result of concern to General Bernard W. Rogers, NATO's supreme allied commander. "If the U.S. withdraws 100,000 troops from Europe, this won't make the West Europeans do more [in terms of their contributions to NATO; rather, such an action] is going to send the kind of message that will lead [the European NATO members] to start to accommodate to the East. It will be an excuse for the U.K. to pull some of its forces back," an action that might stimulate further imitation in Rogers' view.[43] In short, the Brzezinski proposal would most likely prove expensive and politically counterproductive; more important, it is militarily unsound.

FORCE RATIOS. In central Europe improvements beyond the addition of a division equivalent should be made. The current conventional balance, however, is not as bad as is generally assumed. Unfortunately, in reaction to Reykjavik—where ill-considered and disturbing proposals to rapidly eliminate all strategic offensive nuclear arms were discussed—exaggerated assessments of the conventional threat to Western Europe sprang to the fore. Senator Sam Nunn, Democrat of Georgia and chairman of the Armed Services Committee, stated, "We know that the

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[42] Cited in statement of Zbigniew Brzezinski before the Senate Armed Services Committee, January 13, 1987, p. 7. Emphasis in the original.

[43] Edgar Ulsamer, "The Potential Checkmate in Europe," *Air Force Magazine*, vol. 69 (November 1986), pp. 55–56. Brackets in the original.

Soviets and Warsaw Pact currently enjoy an overwhelming advantage in conventional forces."[44] When asked whether he believed that the Soviet Union has superior conventional forces in Europe, Assistant Secretary of Defense Richard Perle likewise responded, "I don't think there's any question about that. The Soviet conventional forces vastly outnumber those of the NATO alliance in virtually every category—tanks, aircraft."[45] More recently, the proposal to eliminate medium- and short-range ballistic missiles from the European theater has prompted further dire assessments, also based on selected numerical differences between conventional forces of NATO and the Warsaw Pact.[46] (A side-by-side comparison of fully mobilized NATO and Warsaw Pact ground divisions and close air support aircraft is given in table 16.)

First, simply as a matter of consistency, if Pentagon leaders really believed static numerical ratios to be as important as such statements suggest, they would be taking money from aircraft carriers, where the United States already vastly outnumbers the Warsaw Pact (14 to 1), and putting money into tanks, rather than proposing to stretch out the latter in order to increase the former. More important, however, as students of military history have long known, static peacetime force ratios are very poor predictors of wartime performance. The only way in which to gauge rigorously the NATO-Pact conventional balance is through dynamic analyses that take into account warfare's dominant operational, tactical, and technological dimensions. As in the Persian Gulf, a static "bean count" alone can be totally misleading.

Though they are no substitute for dynamic analyses (plotted in figures 4 and 5 below), the basic facts of the European situation alone suggest that the conventional wisdom may be unduly pessimistic. For instance, NATO has outspent the Warsaw Pact on defense every year since 1965, and a greater percentage of NATO spending is directed at Europe proper. Roughly 15 percent of Soviet spending is directed at China. The Pact is assumed to be unequivocally superior at the conventional level: NATO puts more money *in*, but the Pact is believed to get more military

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[44] Sam Nunn, "The Reykjavik Summit: What Did We Really Agree To?" speech delivered before the United States Senate, October 17, 1986.

[45] Cited in transcript of Richard Perle on ABC's "Nightline," October 15, 1986 (American Broadcasting Companies, 1986), p. 2.

[46] Indeed, Richard Nixon and Henry Kissinger offer no conventional force data whatever to support their assertion of a "huge Soviet conventional superiority." Richard M. Nixon and Henry A. Kissinger, "To Withdraw Missiles We Must Add Conditions," *Los Angeles Times*, April 26, 1987.

Table 16. M + 90 Static Conventional Balance between NATO and Warsaw Pact Forces on the Central Front[a]

Force	*Division formations*[b]	*Armored division equivalents*[b]	*Weighted unit value*[c]	*Close air forces*[d]
NATO				
United States	24	24⅕	1,149,258	. . .
United Kingdom	4	2½	118,725	. . .
France	12	3⅘	180,462	. . .
West Germany	14	10½	498,645	. . .
Other	7	4⅘	227,952	. . .
Total	61	45⅘	2,175,042	1,500
Warsaw Pact				
USSR	90	60¾	2,885,017.5	. . .
Non-Soviet	30	20¼	961,672.5	. . .
Total	120	81	3,846,690.0	1,600

a. M + 90 stands for mobilization day plus 90 days.

b. From Andrew Hamilton, "Redressing the Conventional Balance: NATO's Reserve Military Manpower," *International Security*, vol. 10 (Summer 1985), p. 116, citing estimates of William P. Mako, *U.S. Ground Forces and the Defense of Central Europe* (Brookings, 1983). Soviet and non-Soviet Warsaw Pact division formations are assumed to have equal ADE scores.

c. Computed by multiplying armored division equivalents by 47,490, the weighted unit value (WUV) of a standard U.S. armored division. Mako, *U.S. Ground Forces*, p. 114. WUV scores provide a common measure of lethality, or combat power, for U.S. and Soviet ground forces. The method was developed by the U.S. Army.

d. Sum of the phase I and phase II fixed-wing and helicopter close air support aircraft for NATO and the Pact, as estimated by Barry R. Posen, "Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment," *International Security*, vol. 9 (Winter 1984–85), p. 72.

capability *out*. The only premises with which this belief is logically consistent are (1) that the Pact is more efficient than NATO or (2) that the Pact's task (offensive warfare) is inherently easier than NATO's (defensive warfare). There is no convincing evidence to support the first premise, while the evidence against the second is weighty. The great Prussian theorist Clausewitz, for instance, held that "*the defensive form of warfare is intrinsically stronger than the offensive*."[47]

One advantage NATO enjoys as defender is the opportunity to fight from prepared positions. By contrast, the attacker must come into the open, exposing himself to fire, in order to advance. Another defensive advantage, the opportunity to fight on familiar terrain, can be exploited to force Soviet armor into poor tank country. In this connection General Glenn K. Otis, commander in chief of the U.S. Army in Europe, recently discussed the terrain constraints Soviet divisions would face in some important NATO Corps sectors: "The road and the chokepoint constraints—built-up areas, villages, mountain peaks, even some swamps—must be considered. You can't put divisions into those areas, or even individual weapon systems."[48] "Instant" antitank ditches, terrain modifications, prechambering of bridges, and other low-technology initiatives are recommended here.[49] They can exacerbate such Soviet problems and increase the effectiveness of advanced weaponry by forcing the Soviets to stop, increasing their exposure to defensive fire.

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[47] Elsewhere, he calls defense "*the stronger form of waging war*." Carl von Clausewitz, *On War*, Michael Howard and Peter Paret, eds. and trans. (Princeton University Press, 1976), pp. 358–59. Emphases in the original.

In addition, America's allies are more reliable than the Soviet Union's. Western active-duty units generally receive more training than Warsaw Pact units, and Western training is by and large much more realistic. It draws on more combat experience and the accumulated expertise of militarily skillful friends—Israel, for example. Finally, according to the Joint Chiefs of Staff, NATO enjoys a substantial technological lead in many critical military areas. Last June, for instance, General Charles A. Gabriel, as Air Force chief of staff, stated that the Russians were ten years from having planes comparable to the U.S. F-15 and F-16.[50] Historically, such qualitative factors have loomed larger than mere numbers in determining outcomes.

AERIAL WARFARE. The asymmetry is especially pronounced in air-to-air combat (table 17). In World War II American pilots in the Pacific theater lost only one plane for every ten Japanese planes they downed—

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[48] Charles D. Odorizzi and Benjamin F. Schemmer, "An Exclusive *AFJ* Interview with General Glenn K. Otis, Commander-in-Chief of the U.S. Army in Europe and Commander of NATO's Central Army Group," *Armed Forces Journal International*, vol. 124 (January 1987), p. 46.

[49] "Instant" antitank ditches are segments of plastic pipe buried (at a depth of perhaps seven feet) in peacetime. In crisis, an explodable slurry or other liquid would be pumped in (it could also be pumped out if desired). Wartime detonation "would create an inverted 'V' tank ditch that at its deepest point would be about 12–15 feet, and at its widest point some 40 feet across," a serious obstacle for tanks. "Buried Explosive System Creates Tank Ditches Quickly," *Defense News*, February 17, 1986. A thousand kilometers of instant antitank ditching is estimated to cost $100 million (plus 5 percent a year in operation and support). The simple conversion of graded road shoulders into sharp concrete steps (and the emplacement of road dividers) would frustrate cross-road movement of armored forces. For another $100 million, 500 kilometers of road could be regraded, and so forth. Bridges and roads could be "prechambered" to accept enough charges to create 20,000 to 30,000 craters in war for roughly another $100 million (and 5 percent a year operation and support). On these and other approaches, see John C. F. Tillson IV, "The Forward Defense of Europe," *Military Review*, vol. 61 (May 1981), pp. 66–76.

[50] George C. Wilson, "Air Force Chief Denies Soviets Ahead in Space," *Washington Post*, June 18, 1986.

Table 17. Exchange Ratios in Aerial Warfare

Theater	*Contestants*	*Winner*	*Exchange ratio*[a]
Pacific (World War II)	United States; Japan	United States	10 to 1
Korea (1950–53)	United States; North Korea	United States	10 to 1
Vietnam (1965–68)	United States; North Vietnam	United States	2.3 to 1
Vietnam (1970–73)	United States; North Vietnam	United States	12.5 to 1
Middle East (1967)	Israel; Arabs	Israel	20 to 1
Middle East (1973–74)	Israel; Arabs	Israel	40 to 1
Lebanon (1982)	Israel; Syria	Israel	86 to 1[b]

Source: Data given in Joshua M. Epstein, *Measuring Military Power: The Soviet Air Threat to Europe* (Princeton University Press, 1984), pp. 110–12.

a. Loser's planes lost to each one of winner's planes lost.

b. 86 Syrian planes shot down with no Israeli losses.

an exchange ratio of 10:1. In the Middle East wars of 1967 (the Six-Day War) and 1973 (the Yom Kippur War), the Israelis scored ratios of 20:1 and 40:1; in Lebanon in 1982 the ratio was more than 80:1. Technological advantages and differences in pilot skill underlie these disparities. It would be imprudent to assume NATO-Pact ratios at the high end of the spectrum, but it is unduly pessimistic to assume that the Pact's modest numerical edge should somehow nullify NATO's superior, and far more extensive, training and its continuing technological lead.[51]

Moreover, in air warfare, as on the ground, defenders may enjoy inherent advantages.[52] These can be supplemented with traditional, proven low-technology approaches to air defense, including increased sheltering for NATO's aircraft, runway hardening and repair, increased point defenses, improved deception and identification-friend-or-foe (IFF) capabilities, high readiness and sortie rates so fewer aircraft are sitting on the ground, and more flying and simulator hours to ensure greater combat effectiveness when they are in the air.

Exploitation of these approaches (none of which are reduced, and some of which are enhanced, under the budgetary alternatives specified here) should make the Soviet air threat manageable. Indeed, a case can be made that, despite important strides since the mid-1960s, the Soviet conventional air threat to Western Europe has been somewhat overrated.[53]

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[51] On the historical record, see Joshua M. Epstein, *Measuring Military Power: The Soviet Air Threat to Europe* (Princeton University Press, 1984), pp. 110–12. On the numerical balance, see Congressional Budget Office, *Tactical Combat Forces of the United States Air Force: Issues and Alternatives* (CBO, 1985), pp. 19–21.

[52] For example, the defender of a high-priority target knows that the Soviet attacker will be *coming to him*, and can create (with electronics) the equivalent of terrain from behind which to ambush the "exposed" attacker.

Under the circumstances, it does not seem sensible to be developing two successors to America's most advanced fighter, the F-15—which, according to General Gabriel, is a decade ahead of Soviet planes—and no successor to the A-10 close air support aircraft designed to counter Soviet armor, with which most decisionmakers purport to be concerned. These priorities seem especially misguided, since the United States already underwrites considerable duplication in air defense.

Consider a typical Soviet fighterbomber. NATO is preparing to kill it once in East Germany by bombing its airbase with F-15Es, F-111s, or conventional ballistic missiles; then NATO will "kill" it a second time in air-to-air combat over West Germany with F-16s or F-15s; then NATO will "kill" it a third time from the ground with Patriot surface-to-air missiles.

All three approaches are necessary. But if one asks any of these three air defense communities whether it assumes any contribution from the others when determining requirements, the answer will probably be no. The result is that the problem is solved three times, not once—or even, to be conservative, one and a half times.

Meanwhile other missions—such as close air support—languish. The adjustments proposed here in funding for the F-15, the F-19 (stealth fighter), the ATF (advanced technology fighter), Patriot, and the helicopter LHX (table 20) are intended to reduce the inefficiency and foster a resurgence of close air support, including the development of a successor to the A-10. Full funding is proposed for the Army's forward area air defense (FAAD) program, which includes the development of a successor to the Sergeant York divisional air defense (DIVAD) system.

GROUND ENGAGEMENTS. As noted earlier, ground defenders historically have enjoyed several tactical advantages; operation from prepared, or even fortified, positions and relative concealment are among them. Where such advantages apply, many claim on the basis of military experience that a competent defender should be able to hold territory even if attacker-to-defender lethality ratios reach 3:1. In the words of a May 1984 NATO Military Committee document, "classical military wisdom suggests that a 3:1 ratio in favor of the offense at the point of attack is necessary to assure a reasonable chance of success."[54] According to the U.S. Army's 1976 version of its operations field manual, FM 100-5, "as a rule of thumb, [defending generals] should seek not to be outweighed more than 3:1 in terms of combat power. With very heavy air and field artillery support on favorable terrain, it may be possible to defend at a numerical disadvantage of something like 5:1 for short periods of time."[55] Similarly, on the Soviet side, the European Security Study report notes that "the minimum numerical superiority ratio sought by the Pact is about 3 to 1 in both ground and air operations. Doctrinally, however, the ratios to be achieved in local conflict situations are to be higher."[56] Indeed, according to the Pentagon, the Soviets' large military inventories in part "reflect the offensive nature of Soviet military doctrine and strategy in that attacking forces are believed to require at least a 5:1 force ratio in anticipation of high losses inherent in offensive operations."[57]

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[53] See Epstein, *Measuring Military Power.*

Even if, in raw firepower, NATO were outweighed to such a degree (and it is not), geographic constraints would most likely prevent the Soviets from amassing local force ratios of such magnitudes. Only so much force can be concentrated on a given sector of battlefront. Recent Army analyses have highlighted these so-called force-to-space constraints, and have led General Otis to cut by half the Soviet force he expects his Army group to engage initially: "Today that [force] equates to a little less than seven divisions, whereas before, we were looking at that [same force] as a 12-to-14 division front. So 12 to 14 divisions might well be there, but they're not all going to be shooting at once because [of] the terrain and geographic limitations." Perhaps this reasoning underlies the general's claim that with "the total NATO capability available to Central Army Group, the first echelon of the Soviet forces is going to have a whale of a time doing anything to us."[58]

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[54] Karsten Voigt, rapporteur, "Draft Interim Report of the Sub-Committee on Conventional Defence in Europe" (Military Committee of the North Atlantic Assembly, May 1984), p. 8.

[55] Department of the Army, *Operations: FM 100-5* (Department of the Army, 1976), p. 5-3.

[56] Donald R. Cotter, "Potential Future Roles for Conventional and Nuclear Forces in Defense of Western Europe," in *Strengthening Conventional Deterrence in Europe: Proposals for the 1980s*, Report of the European Security Study (St. Martin's Press, 1983), p. 214.

[57] Department of Defense, *Soviet Military Power*, 5th ed., p. 63.

[58] Odorizzi, "Exclusive *AFJ* Interview with General Glenn K. Otis," pp. 46–47.

Moreover, even after a major mobilization in which the Soviets' second and third echelons (in the USSR) were included, the Warsaw Pact would still not enjoy lethality ratios as high as those said to be needed for high offensive confidence (table 16).

Giving NATO far less credit than the Army's own planning factors would warrant, dynamic simulations of warfare between these fully mobilized forces indicate that NATO has the material wherewithal to stalemate the Warsaw Pact. The solid and dotted curves of figure 4 simulate two NATO–Warsaw Pact wars, each of which is consistent with the prewar static balance as measured in table 16 (that is, with NATO's initial combat power score at 2.2 million and the Pact's at 3.8 million). The curves simulate—in an abstract but conservative way—the mutual attrition over time of NATO and Warsaw Pact forces, the salient point being that, in each case, NATO comes from behind to stalemate the initially larger Warsaw Pact force.[59]

Although a successful conventional forward defense is plausible today, there is little room to spare. No one, on either side of the Atlantic, should be under any illusions about the effect of a significant withdrawal of U.S. combat power. Simply to illustrate the point, the withdrawal of 100,000 *combat* troops, from the mobilized 24 U.S. division formations assumed above, would represent roughly 6 divisions (at 16,000 troops per division), a 25 percent reduction in the U.S. ground complement, and would result in the conventional outcome simulated in figure 5.[60] Almost all of West Germany would be lost, and NATO forces pummeled into defeat, after about five weeks. NATO would be quickly forced to choose between capitulation and nuclear war.

Assessments showing NATO to be the Pact's equal today will change if NATO allows Soviet military investments to go unanswered or fails to maintain its forces in a state of readiness. Such assessments also assume that NATO would properly respond to warning of a Soviet attack, mobilize in a timely way, and be able to sustain nonnuclear operations.[61]

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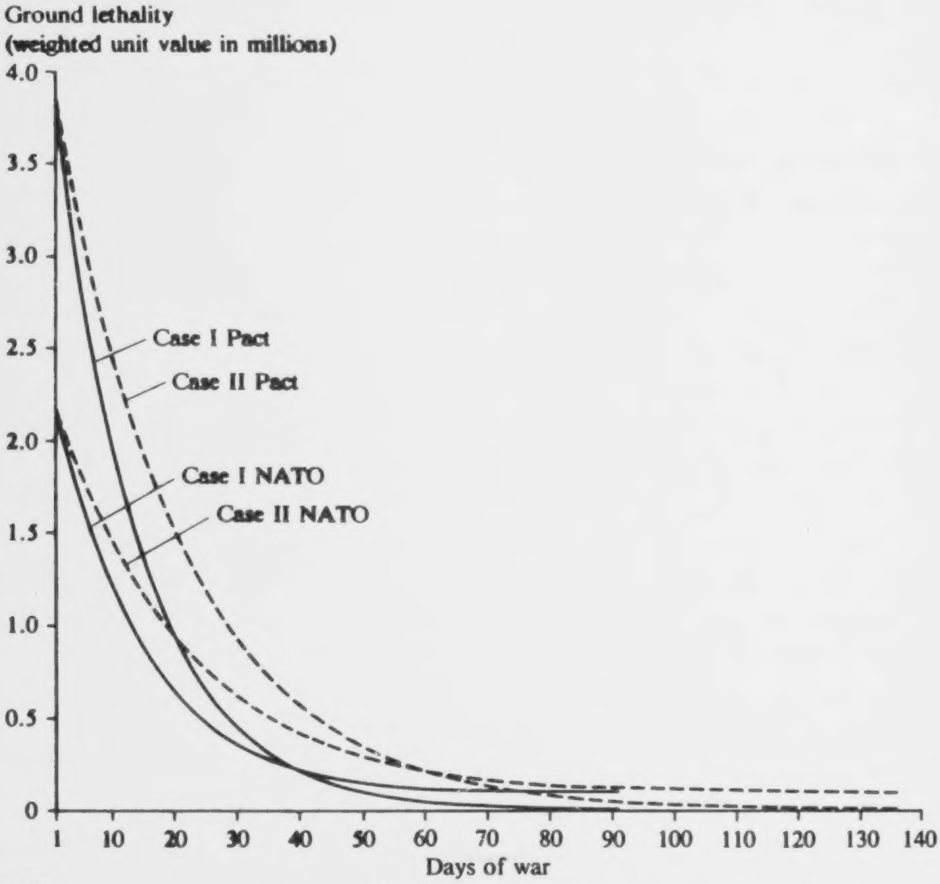
[59] Technically, since the curves cross, NATO "wins" in these simulations. But the absolute levels of attrition are close enough to mutual annihilation to make "stalemate" the more conservative and appropriate term. In neither simulation does NATO lose ground.

[60] This reduction roughly equates to the withdrawal of 100,000 U.S. *combat* troops, or 6 divisions (at 16,000 troops per division) plus a number of close air support forces.

[61] On NATO's current sustainability, see Joshua M. Epstein, *The 1987 Defense Budget* (Brookings, 1986), pp. 45–47.

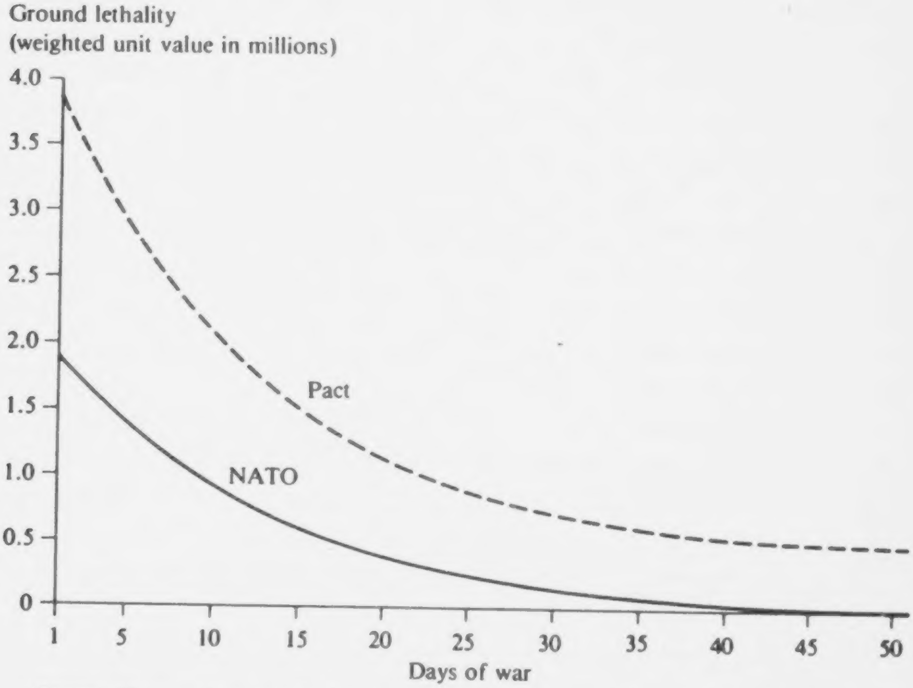
Figure 4. The Dynamic Conventional Balance between NATO and Warsaw Pact Forces on the Central Front



Sources: Simulations produced by applying the static numerical estimates of table 16, and other factors, in the dynamic model set forth in Joshua M. Epstein, *The Calculus of Conventional War: Dynamic Analysis without Lanchester Theory* (Brookings, 1985). The other factors employed (see *The Calculus* for complete definitions) are as follows: an average offense-defense ground-to-ground casualty-exchange ratio of 1.85 (far lower than divisional cost ratios and lower than traditional military offense-versus-prepared-defense planning factors of up to 3:1; see Barry R. Posen, "Measuring the European Conventional Balance: Coping with Complexity in Threat Assessment," *International Security*, vol. 9 [Winter 1984–85], pp. 51–52 note, 56, 80–81; and John J. Mearsheimer, "Why the Soviets Can't Win Quickly in Central Europe," *International Security*, vol. 7 [Summer 1982], pp. 15–16); a NATO withdrawal threshold ground attrition rate (in ADEs) of 6 percent a day; a maximum withdrawal rate of 20 kilometers a day (actual withdrawal rates are assumed to depend on the difference between actual attrition rates and the withdrawal threshold rate, here 6 percent); and a Pact equilibrium daily attrition rate of 7.5 percent.

These assumptions conservatively credit the Pact with the capacity to endure attrition rates higher than those NATO is willing to suffer before giving ground (7.5 versus 6 percent). By historical standards, these rates are very high; even so, a fight to the finish lasts three months. For historical rates, see Posen, "Measuring the European Conventional Balance," pp. 79–80. Thirty-three percent reductions in the Pact's equilibrium attrition rate (from 7.5 to 5 percent), in its opening prosecution rate (from 5 to 3.3 percent), and in NATO's withdrawal threshold (from 6 to 4.5 percent) would prolong the war by more than a month, to 136 days, as shown in case II. These are the only assumptions that differ from case I. Each side's close air attrition rate per sortie is 5 percent, high historically; armored fighting vehicles (AFVs) killed per NATO sortie is 0.5, and 0.25 for the Pact; 1,200 AFVs per division equivalent are assumed (see Posen, "Measuring the European Conventional Balance," pp. 72–73). NATO is assumed to average 3 sorties per day; the Pact, 2. For a discussion of comparative Soviet/Western strengths and weaknesses in the ground support of air operations, see Joshua M. Epstein, *Measuring Military Power: The Soviet Air Threat to Europe* (Princeton University Press, 1984), chaps. 2, 3.

Figure 5. Effect of a 25 Percent Reduction in American Force on the NATO–Warsaw Pact Balance



Sources: All assumptions are as in figure 4, with the U.S. ADE score and NATO's close air support force reduced by 25 percent.

There is no reason why NATO, history's richest alliance, should fail to meet its requirements and mount an imposing nonnuclear deterrent to conventional attack, especially if all the allies honor their commitments, if a U.S. heavy division equivalent is reallocated from the Gulf to NATO, and if a program of terrain enhancement and obstacle preparation is instituted, as proposed here.

Role of the U.S. Navy

For the Atlantic Alliance to sustain conventional ground and tactical air operations for more than a few months, the U.S. Navy would have to defend NATO's sea line of communication (SLOC) from bombers and submarines of the Soviet Northern Fleet, based at Murmansk on the Kola Peninsula. But this primary naval objective might be achieved in either of two ways: defensively or offensively. The first tactic would have the Navy deploy its aircraft carrier battle groups (CVBGs) near the so-called GIUK (Greenland-Iceland-U.K.) gaps, and lie in wait for the

Soviets, forcing them to run a series of defensive gauntlets before engaging the carriers and Europe-bound convoys. The alternative would be to assemble a large-scale offensive naval strike force and steam north of the GIUK, north of Norway, and around the North Cape to defeat Soviet forces in their home waters. This offensive campaign is a cornerstone of the Navy's maritime strategy, which provides the doctrinal underpinnings for the 15-carrier, 600-ship navy approved by the Reagan administration.

How would a 15-carrier fleet be likely to fare in offensive operations against the Soviet Northern Fleet, given the Navy's stated requirements elsewhere in the world, especially on the assumption—also central to the maritime strategy—of a global war of high intensity, including the option of attacking the Soviet Pacific Fleet (based at Vladivostok and Petropavlovsk)? Specifically, is it plausible that a 15-carrier fleet would succeed in conducting offensive operations in these high-threat areas, as contemplated in the maritime strategy? The answer is no.

To have moderate confidence of success in executing, with aircraft carriers, the offensive missions contemplated in the maritime strategy, the U.S. Navy would need at least a 21-carrier fleet, at ten-year costs exceeding those of the planned 15-carrier fleet by roughly $158 billion. That number is based on an analysis that is explicitly set forth in the note below.[62] Without encumbering the discussion in the text with the technicalities, some of the basic points of the analysis deserve note.

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[62] The calculation proceeds as follows. The number of carriers required simply to enjoy a reasonable chance of survival against the forces of the Kola complex and supporting air bases depends on (1) the number of direct hits each carrier can suffer before being knocked off station, and (2) the number of carriers required to keep hits per carrier below that level. From Navy curves published in Capt. Stephen T. De La Mater, USN, "The Role of the Carrier in the Control of the Seas," *United States Naval Institute Proceedings*, vol. 98 (May 1972), pp. 110–25, Brian Mccue has reconstructed the number of hits, n, needed to achieve a probability, p, of mission kill: $n = \ln(1 - p)/\ln(1 - x)$, where $x = 0.25$ for 90,000 ton carriers. For each carrier to have a 20 percent chance of survival, hits (in integers) must not exceed six; that is the criterion used here. One may check that six expected hits per carrier result if 9 carriers are sent against the Soviet forces shown in table 18, when the attrition rates given there are broken down into two ingress barriers (from within which Soviet munitions are launched) and two egress barriers (through which attackers must escape to return to base for rearming and so forth). For Soviet bombers, the ingress survival probabilities are .8 and .7 and egress are .85 and .9, for the overall full-cycle attrition rate of .57. For Soviet submarines of both types, the corresponding values are .7, .65, .75, and .8, for the full-cycle attrition rate of .73. Soviet forces are simply cycled in and out of these barriers,

Most important, assumptions are simply unavoidable in any analysis. And the assumptions used in the analysis may be wrong. But their accuracy is not the critical issues. Rather, the essential question is whether the assumptions are unfavorable to the Navy. If, as intended, the assumptions favor the Navy, and the mission appears unpromising, then on more accurate (less favorable) assumptions, it can only look *more* unpromising.

MODEL ASSUMPTIONS FORMALLY FAVORABLE TO THE NAVY. Some of those favorable assumptions are implicit in the model, independent of the numbers that are applied in it. For example, the calculation does not permit any degradation in the carrier's defensive performance as hits accumulate. Carrier defenses perform as well after taking one hit as they do having taken no hits—as well after two hits as after one, all the way up to the number of hits required for "mission kill." Similarly, the equations do not represent any interference (1) between carrier battlegroups as the number operating "in concert" grows, or (2) among power projection and fleet air defense operations on any carrier's busy deck. Perfect weather is, by exclusion, assumed, though foul weather would

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firing from within the outer two, until hits per sortie are less than .5. Attacking Soviet platforms are assumed to be distributed evenly over whatever number of U.S. carriers are sent. The same barrier performance and overall hit probabilities for Soviet munitions are assumed for the Pacific offensive, but Soviet forces there number 104 bombers, 26 cruise missile submarines, and 62 torpedo submarines. Once fired, Soviet munitions must, in sequence (1) prove reliable, (2) penetrate the carrier's point defenses, (3) overcome electronic countermeasures and deception, and (4) hit the target. The overall hit probabilities given in table 18 are the products of these probabilities. They are assumed to be the same for Murmansk and Petropavlovsk and are as follows: for bombers, .9, .75, .5, .3; for cruise missile submarines .9, .75, .8, .1; for torpedo submarines .85, 1.0, .7, and .05.

When these values are applied in the calculation described above, 9 carriers for the Kola and 6 for the Pacific result (hits per carrier are six in each case). The force numbers for bombers are taken from John M. Collins, *U.S.-Soviet Military Balance 1980–1985* (Washington, D.C.: Pergamon-Brassey's, 1985), p. 147; a readiness level of 80 percent is assumed. Force numbers for cruise missile and torpedo submarines are from the International Institute for Strategic Studies, *The Military Balance 1985–1986* (London: IISS, 1985), pp. 26–29. Sources for munitions per sortie are as follows. For bombers, International Institute for Strategic Studies, *The Military Balance 1986–1987* (London: IISS, 1986), p. 206; for cruise missile submarines: The Royal Ministry of Defence (Norway), Press and Information Office, "Development of the Soviet Forces in Our Sphere of Interest During the Past 20 Years," Current Defence Issues No. 0185 (April 1985), annex 6; and for torpedo submarines, *Jane's Fighting Ships 1986–87* (London: Jane's Publishing, 1986), pp. 544–55.

Table 18. Summary of Assumptions for Kola Offensive

Soviet weapon type	*Munitions launched per sortie*	*Initial attack force*	*Attrition rate per sortie (percent)*	*Overall hit probability per munition*
Antiship missile bombers	2	200	57	.10
Cruise missile submarines	8	35	73	.05
Torpedo submarines	6	71	73	.03

Source: See note 62 in the text.

probably hurt carrier operations more than it would hurt Soviet land-based bomber operations—if for no other reason than that a land airfield does not pitch in rough seas.[63] Various threats to the U.S. carriers are also left out of account: Soviet surface cruisers, destroyers, frigates, mines, and tactical air forces. All these favorable assumptions obtain regardless of what numbers are applied in the calculation.

MODEL ASSUMPTIONS NUMERICALLY FAVORABLE TO THE NAVY. Beyond the favorable assumptions implicit in the computational procedure per se are numerical assumptions. These, again, seem favorable to the U.S. Navy. Boiled down, they appear in table 18.

First, future U.S. carrier fleets (for example, the 15-carrier fleet) are sent to do battle with current Soviet bomber and submarine forces. Obviously, if—as would have been more realistic—carrier requirements were assessed against future Soviet bomber and submarine forces, the number of carriers required would be greater.

Second, Soviet attrition rates are vastly higher than any recorded in recent military history, from the Battle of the Atlantic (for subs) to the Marianas Turkey Shoot (for air); in particular, U.S. anti-air performance is stellar. Here one is speaking of Soviet bomber attrition rates of 57 percent per sortie, far higher than the highest rates (36 percent) suffered by the United States in World War II, at the battle of Midway, June 4, 1942.[64] Soviet hit probabilities, by contrast, are positively lackluster. For air-delivered munitions they are .1, which is less than one-quarter of what U.S. precision-guided munitions achieved against bridges in Vietnam.[65]

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[63] It could, however, be argued that a carrier would be harder to find—and hence attack—in bad weather.

[64] Jeffrey H. Grotte, *Alternative Surface Navy Force Structures for the Future*, IDA Paper P-1705 (Alexandria, Va.: Institute for Defense Analyses, 1983), p. 31.

[65] See Epstein, *Measuring Military Power*, pp. 148–49.

All in all, then, it is difficult to believe that—while hardly realistic—the analysis is biased against the United States Navy. That, however, is what one must show to discredit the conclusions.

Even on these assumptions, for any confidence (carrier survival probabilities exceeding 20 percent) of success against the forces of the Kola complex and supporting air bases, the required number of carriers is 9. When the same analysis is done to determine the number required for equal confidence of survival against the Soviet Pacific Fleet, the result is 6.[66]

Adding the Navy's wartime requirements for 2 carriers apiece in the Indian Ocean, Mediterranean, and Eastern Pacific, and assuming generously that the Navy could keep 100 percent of its fleet on station in wartime,[67] *the maritime strategy carrier fleet totals 21, at incremental ten-year costs of about $158 billion.* If, perhaps more realistically, one assumes that only 75 percent of the fleet can be kept on station in war, the peacetime inventory needed to keep 21 carriers fighting is 28; 13 more than the 15-carrier fleet, and over $340 billion more in ten-year costs (table 19). Clearly, either fleet is out of the question budgetarily. For the Navy, the mismatch between strategy and forces could not be starker.[68] For the nation, however, this is not especially troublesome, since defensive carrier employment would be every bit as effective as offensive operations in accomplishing what is essential: protection of the sea-lanes.

Detailed analyses recently declassified demonstrate that the substitution of land-based for carrier-based aircraft would prove equally effective in addressing the bomber threat to convoys at one-fifth the cost.[69] In fact, on the basis of these assessments, the United States could efficiently secure the sea-lanes from attack with a fleet of as few as 8 carriers if land-based and other alternatives to carrier-based airpower

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[66] See note 62.

[67] For the Navy's assumption that 100 percent of the fleet can be kept on station in war, see "Prepared Statement of Hon. John F. Lehman, Jr., Secretary of the Navy," in *Department of Defense Appropriations for 1987*, Hearings of the Subcommittee on the Department of Defense of the House Committee on Appropriations, 99 Cong. 2d sess. (GPO, 1986), p. 289.

[68] The Navy's repeated claim that the maritime strategy is a strategy "for today," moreover, could not be further from the mark in this light.

[69] Jerome Bracken and others, *Land-Based and Sea-Based Barrier Air Defense of the North Atlantic Sea Line of Communications*, IDA Report R-230 (Alexandria, Va.: Institute for Defense Analyses, 1977). Formerly secret; declassified December 31, 1985.

Table 19. U.S. Carrier Forces Required for Offensive and Defensive Sea Control

Item	*Offensive (carrier intensive)*		*Defensive (land-based air intensive)*	
Atlantic Sea Control	9		0	
Pacific Sea Control	6		2	
Indian Ocean and Arabian Sea	2		2	
Mediterranean	2		2	
East Pacific	2		2	
Total on station for global war	21		8	
Wartime on-station rate (percent)	100	75	100	75
Required peacetime inventory	21	28	8	11
Number beyond 15	6	13	−7	−4
Additional ten-year cost (billions of fiscal 1988 dollars)[a]	158	342	−53[b]	−30[b]

Source: See note 62.

a. Jerome Bracken and others, *Land-Based and Sea-Based Barrier Air Defense of the North Atlantic Sea Line of Communications*, IDA Report R-230 (Alexandria, Va.: Institute for Defense Analyses, 1977), p. D-20. When Department of Defense TOA (total obligational authority) deflators (grand total of 52.86) are used to convert fiscal 1977 to fiscal 1988 dollars, IDA's costs per battle group are $18.8 billion a year in investment and $0.75 billion a year in operation and support. TOA deflators are from OASD, *National Defense Budget Estimates for FY 1988/1989*, p. 52.

b. Operation and support only.

were fully exploited (table 19). Over ten years such approaches would cost more than $50 billion less than the 15-carrier fleet. A force of 12 carriers represents a compromise. In no event should Congress appropriate monies for further carrier construction.

Moreover, although the Navy has never convincingly argued that offensive operations against the Kola Peninsula would be more effective than defensive operations in protecting sea-lanes, even if one grants the necessity for such attacks, it still does not follow that carriers are a good buy. On a life-cycle cost basis, in fact, the aircraft carrier is overwhelmingly dominated by conventional cruise missile carrying aircraft and submarines (figure 6).[70]

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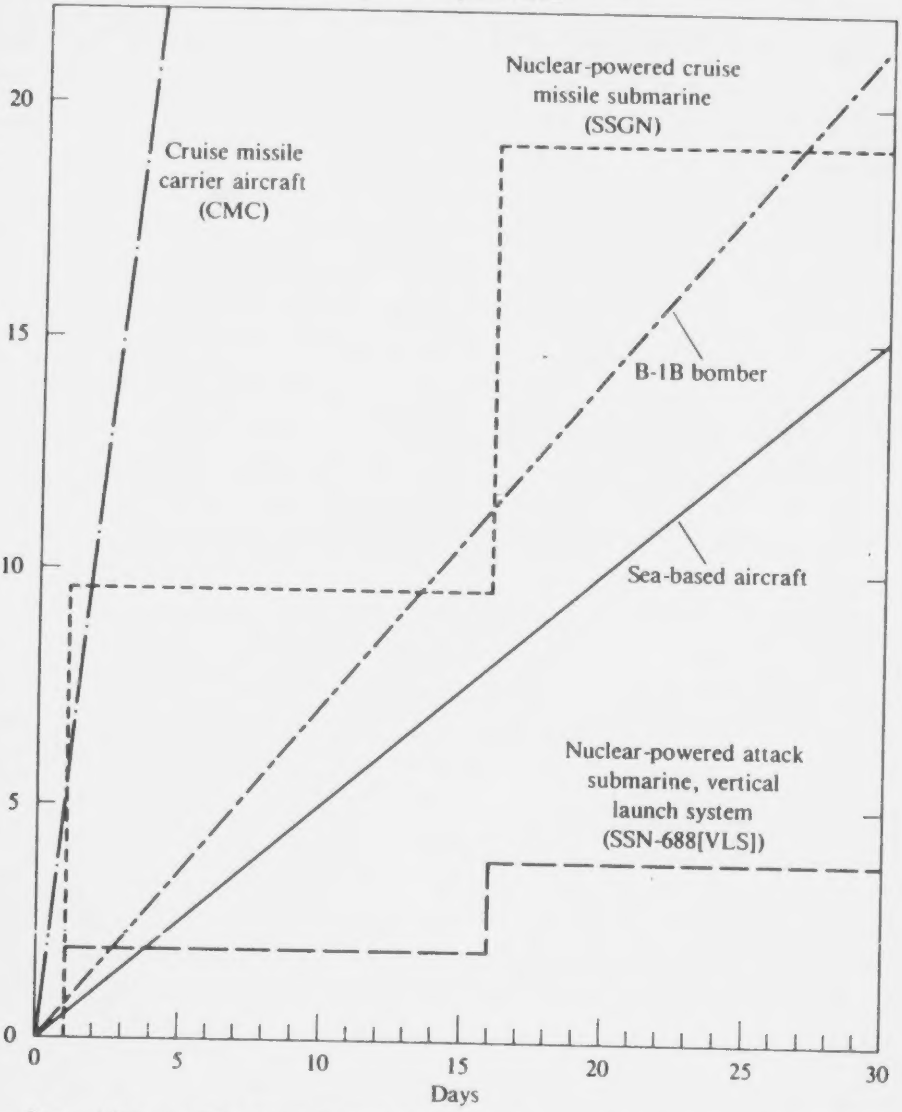
[70] This, in fact, addresses the Navy's argument that it would only send carriers against the Kola Peninsula—home of the Soviet Northern Fleet—after Soviet naval aviation had suffered severe attrition. With what weapons is this severe attrition accomplished? Why not apply more of those weapons (for example, conventional cruise missiles) and finish the job, rather than invest tens of billions to be able to finish it with carriers? (Of course, any set of assumptions that makes carrier offensives against the Kola Peninsula appear feasible will make carrier operations near the GIUK look easy by comparison.)

Figure 6. Cruise Missile Delivery Potential of Forces with Equal Life-Cycle Costs

Thousands of cruise missiles (or equivalents) delivered



Source: Jeffrey H. Grotte, "Alternative Surface Navy Force Structures for the Future." IDA Paper P-1705 (Alexandria, Va.: Institute for Defense Analyses, Program Analysis Division, December 1983), p. 27.

SUBMARINE OFFENSIVES. Associated with the maritime strategy's offensive surface naval actions are offensive submarine operations that would aim to put Soviet nuclear ballistic missile submarines (SSBNs) at risk. There is every reason to believe this conventional counterforce campaign would be undertaken intentionally, as a deliberate attempt to degrade the Soviets' strategic retaliatory capability by conventional means.[71]

The U.S. Navy's wish to improve its capability to execute these operations underlies the administration's two-year request of $2.1 billion for the SSN-21 "Seawolf" nuclear-propelled attack submarine, the first of which would be procured in fiscal 1989.

First, trends in Soviet submarine quieting call into question the long-term feasibility of these counter-SSBN operations.[72] Second, even if they are feasible, are they advisable?

Assuming feasibility for the moment, such operations could prove escalatory: "a deliberate conventional campaign against Soviet SSBNs could be understood by the Soviets as the beginning of a damage-limiting strategic first-strike. . . even the appearance of such a campaign could trigger dire consequences."[73] The mere fact that U.S. nuclear weapons had not been used to destroy Soviet strategic weapons would not make the latter's annihilation any less momentous; Soviet assured destruction capabilities would be degraded. Under such circumstances, the prospect of Soviet escalation might well be raised. If so, American aircraft carriers operating in the vicinity of the Soviet homeland would themselves make attractive targets for Soviet nuclear response.[74]

The Navy argues that the aim of these subsurface offensives would be to force the Soviets into a defensive posture from which they could not threaten NATO's sea lines of communication. By the time the SSN-21 would be deployed in numbers, however, the Soviets might not feel under great pressure to cooperate by withholding their nuclear-powered attack submarines to defend their SSBNs. The passage north of Soviet SSBNs to the relatively safe shallow waters at the edge of the ice cap could be protected by other, smaller, submarines and airpower. And through quieting, these SSBNs will have been made inherently more difficult to attack.[75] The net result might be that the United States would squander the conventional sea control capabilities of its SSN force in a fruitless effort to attack Soviet SSBNs, while freeing the Soviets' best attack submarines to harass NATO's sea-lanes—exactly the reverse of the strategy's intent.[76]

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[71] Admiral James D. Watkins, U.S. Navy,"The Maritime Strategy," *The Maritime Strategy* (Annapolis: U.S. Naval Institute, 1986), pp. 2–17, esp. pp. 11, 14, 17.

[72] On attacking Soviet SSBNs, see Tom Stefanick, *Strategic Antisubmarine Warfare and Naval Strategy* (Lexington Books, 1987), chap. 6.

[73] Barry R. Posen, "Inadvertent Nuclear War? Escalation and NATO's Northern Flank," *International Security*, vol. 7 (Fall 1982), p. 43.

[74] As Bernard Brodie put it, "what better targets are there for such [tactical nuclear] weapons than our nice, big aircraft carriers." Letter from Bernard Brodie to Adm. Stansfield Turner, January 16, 1976, as quoted in Desmond Ball, "Nuclear War at Sea," *International Security*, vol. 10 (Winter 1985–86), p. 8.

Parallel arguments are offered to support offensive U.S. aircraft carrier operations against Soviet forces in the north. But if the cost of tying down Soviet air forces in the north with U.S. battle groups is four or five times the price of defeating those forces by using land-based tactical aircraft in NATO's center region, then the approach again is inefficient. More to the point, though, can the Navy be sure the Soviets would be tied down at all? Perhaps it is the United States and not the Soviet Union that has been lured into allocating vast sums to long-war, horizontal-counteroffensive naval capabilities when the main Soviet objective would be a short land war focused on Germany.

Sometimes the reinforcement of Norway (which fields a tough defense of its own) is offered as a justification for the maritime strategy. But it is not necessary to threaten the strategic nuclear retaliatory capabilities of the Soviet Union (that is, Soviet nuclear ballistic missile submarines) to reinforce Norway. Nor is it necessary to land Marines on the Kola Peninsula and outflank a Soviet overland threat to Norway. The terrain facing a Soviet land attack is formidable. The transportation system is sparse and vulnerable (bridges can be prechambered to accept explosives in crisis) and offers great leverage to a skillful defender, as the Finns proved to the Russians in the winter war of 1939–40. The Soviet amphibious threat to Norway, in turn, can be addressed by the Norwegian navy, defensive mining, and shore-based airpower and artillery, while the Soviet air threat can be met with land-based aircraft from upgraded Norwegian fields (with a U.S. reinforcement from Scotland or the south Norwegian Sea if necessary).

Finally, third world peacetime contingencies and "showing the flag"—

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[75] See Stefanick, *Strategic Antisubmarine Warfare*, chap. 6. The Soviets will also have deployed mobile land-based ICBMs, which substitute to some extent for SSBNs, and might permit a slightly more relaxed attitude about moderate SSBN attrition.

[76] Moreover, even if the Navy could show that this approach was feasible and without nuclear risk, it would remain to be demonstrated that an offensive approach was less expensive than a defense of the sea-lanes farther south, using land-based antisubmarine forces, mining, and cheaper, diesel-powered, submarines operating near the GIUK gaps.

Table 20. Proposed Alterations to the Administration's Conventional Defense Plan, Fiscal Years 1988–89
Billions of dollars

Program	Action	*Budget authority (050) savings*	
		1988	*1989*
Navy			
2 nuclear aircraft carriers (CVNs)	Deny funding	0.7	0.8
Carrier service life extension program (SLEP)	Cancel	0.8	0.1
F-14, A-6 aircraft	Cut for 12 aircraft carrier battle groups	2.4	2.7
DDG-51 (Arleigh Burke) destroyer	Reduce by 2 a year	1.5	1.5
CG-47 (Aegis) cruiser	Reduce by 1 a year	1.0	0.9
SSN-21 nuclear attack submarine	Cancel procurement funds	0.3	1.5
SSN-688 nuclear attack submarine	Reduce to 2 a year	0.6	0.0
TAO fleet oiler	Reduce by 1 a year	0.1	0.1
V-22 aircraft	Cancel	0.5	0.7
Army and Air Force			
Advanced tactical fighter (ATF)	Freeze at 1987 level	0.3	0.5
LHX helicopter	Cancel and reprogram half to fixed-wing competition	0.2	0.3
AMRAAM (advanced medium-range air-to-air missile)	Freeze at 1987 level	0.2	0.3
Patriot air defense missile	Reduce to 500 a year	0.3	0.4
M2 Bradley fighting vehicle	Cancel; replace with improved TOW vehicle (ITV) and upgraded M113[a]	0.6	0.3
F-15 aircraft	Reduce growth to 28 a year	0.6	0.6
F-19 aircraft	Cancel	0.1	0.1
Follow-on forces attack/deep attack programs	Delay[b]	0.2	0.3
Low-technology defensive preparations	Instant antitank ditching, terrain modification, prechambering of bridges	−0.2	−0.2
Airbase survivability	Expand current program	−0.2	−0.2
Strategic mobility			
C-17 aircraft	Cancel	1.9	2.1
Fast sealift	Expand at 4 a year	−0.4	−0.4
Operation and maintenance	Alter funding[c]	2.4	2.5
Total savings in budget authority	. . .	13.9	14.9
Resulting savings in outlays	. . .	(4.8)	(9.4)

Sources: Department of Defense, *Program Acquisition Costs by Weapon System, Fiscal Years 1988 and 1989*, pp. 32, 33, 42, 48, 74, 81, 88, 89, 90, 95, 96, 99, 103, 142, 145, and *Fiscal Year 1984*, p. 103; and Federation of American Scientists.

[a] This option is discussed in Congressional Budget Office, *Reducing the Deficit: Spending and Revenue Options*, 1986 Annual Report, pt. 2 (CBO, 1986), pp. 50–51.

[b] See CBO, *Reducing the Deficit: Spending and Revenue Options*, 1987 Annual Report, pt. 2 (CBO, 1987), pp. 40–41. For a fuller elaboration of the follow-on forces attack strategy and the main criticisms that can be lodged against it, see Epstein, *The 1987 Defense Budget*, pp. 39–41.

[c] See CBO, *Reducing the Deficit: Spending and Revenue Options*, 1987 Annual Report, pt. 2, pp. 52–53.

peacetime presence—are given as rationales for the maritime strategy. But under the current budgetary constraints, the burden of proof is on the Navy to articulate (1) the number of simultaneous peacetime presence missions for which the United States should plan, (2) why a fleet of 12 carrier battle groups (and 4 surface action groups) should be inadequate to the task, and (3) why all the carriers must be 90,000-ton, rather than smaller, vessels.

CONCLUSIONS. The dominant issue, however, is the maritime strategy's contribution to conventional defense in the big contingencies, notably the conventional defense of Western Europe. And in that connection the basic point is that if NATO loses the short war (which the Soviets plan for), then long-war capabilities—of which navies are the exemplar—will be pointless. In effect, the maritime strategy represents a massive diversion of resources from the immediate defense of Western Europe into offensive surface and subsurface naval actions that are inefficient in accomplishing essential naval tasks (for example, the defense of sea-lanes) and that could prove escalatory on the generous assumption that they are feasible. Under current budgetary constraints, it is high time to abandon this risky and expensive approach. The administration's $1.4 billion two-year request to begin funding for 2 new large-deck nuclear-powered attack aircraft carriers should be denied, and other naval growth rates reduced to levels consistent with a 12-carrier-battle-group force structure. Procurement funding for the new SSN-21 submarine can be deferred, also without detriment to the Navy's ability to execute its essential missions in war or to support American foreign policy objectives in peace.

The complete set of conventional adjustments recommended in this section is shown in table 20.

Summation

The adoption of the nuclear and conventional proposals elaborated in this study would impose net reductions of $22.2 billion and $25.1 billion in defense budget authority in fiscal 1988 and 1989. Resulting levels of budget authority would be $289.8 billion ($100 million above a nominal freeze) and $307.3 billion. Growth rates, after inflation, would be −4.3 percent and +2.5 percent (table 21).

The composition of these reductions reflects priorities that differ sharply from those of the administration. First, to recall the budget

Table 21. Recommended Adjustments to the Administration's Defense Program, Fiscal Years 1988–89[a]
Billions of dollars unless otherwise specified

Item	*1988*	*1989*
Savings in strategic nuclear programs	8.3	10.2
Savings in conventional programs	13.9	14.9
Total savings in budget authority	22.2	25.1
Resulting levels of budget authority	289.8	307.3
Percent real budget authority growth (year-to-year)	−4.3	2.5
Total savings in outlays	7.0	14.8
Resulting levels of outlays	290.6	297.4
Percent real outlay growth (year-to-year)	−1.6	−1.3

Sources: Tables 3, 15, 20.
a. Adjustments to the National Defense Function (050).

categories discussed at the outset, the proposed reductions are focused on the investment accounts, notably procurement and R&D. While (because of relatively low outlay *rates*) they have only a limited immediate effect on the deficit, these reductions (because of their substantial *size*) generate large outlay savings in the future. Deficit reduction would gather momentum (a negative "bow wave," if you will) without detriment to the immediate combat capability of U.S. forces.

Although, by most accounts, strategic forces represent less than 20 percent of the defense budget, they absorb 60 percent of the reductions proposed here for fiscal 1988. Conventional forces, in that sense, take priority over strategic.

Within the strategic forces, full funding for the Trident submarine and D-5 missile programs, for stealth and nonstealth cruise missiles, for the B-1 bomber, and for completed deployment of 50 MX missiles will provide robust prompt and delayed retaliatory capabilities against even the hardest of Soviet targets. Further counterforce capabilities, in the form of mobile Midgetman or rail-mobile MX, are unnecessary from the standpoint of target coverage (the more so given the projected shrinkage in the Soviet-hard target base), even on the questionable assumption of survivability. Profound skepticism regarding the technical feasibility, affordability, and stability of a transition to the world of "assured survival" is evident in the sharp reductions proposed for the president's strategic defense initiative. These measures—also out of concern for strategic stability—would effectively preclude the early deployment of space-based partial defenses. A prudent level of continuing research on strategic defense would be sustained. The stealth *technologies* are funded (for instance, through the advanced cruise missile program), while the procurement of duplicative *platforms*, such as the stealth (advanced technology) bomber, is not.

Finally, within the nonnuclear sphere, the administration's request for tanks and antiarmor munitions is honored, and a cost-effective replacement for the Bradley fighting vehicle is provided. An additional heavy division equivalent would be created for NATO (from superfluous light divisions oriented toward the Persian Gulf), where defensive preparations, sealift, and fixed-wing close air support receive additional impetus. Improvements in NATO's (underrated) conventional defense capabilities would be more than paid for through reductions in inefficient strategic, tactical air, and, especially, naval programs.

INTERNATIONAL AFFAIRS

FRIDAY, JANUARY 23, 1987

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 9:45 a.m., in room SD-608, Dirksen Senate Office Building, Hon. Lawton Chiles (chairman of the committee) presiding.

Present: Senators Chiles, Johnston, Sasser, Exon, Simon, Sanford, Conrad, and Grassley.

Staff present: Richard N. Brandon, staff director; and Douglas Olin, assistant director for budget systems.

For the minority: G. William Hoagland, staff director; and Charles Flickner, senior analyst for international affairs.

OPENING STATEMENT OF CHAIRMAN CHILES

Chairman CHILES. Good morning, Mr. Secretary. We are pleased to have you with us at our Budget Committee meeting.

My understanding is that Senator Domenici is under the weather today, so he will not be able to be with us. He has a statement which I will insert in the record.[1]

For more than four decades, foreign assistance has been one of the mainstays of our national defense, and to the extent that we can help our friends be strong, we provide for stability and promote our own security.

INCREASES UNREALISTIC

Over the years, we have been generous. Since 1981, we have been very generous. Grant military aid is up over 700 percent. Economic Support Fund cash transfers have climbed 69 percent, and during that time the State Department has added over 4,300 new employees, with salaries and expenses going up some 77 percent. Even when it comes to building and maintaining American embassies, we have seen an increase of over 280 percent.

All of these expenses might have persuaded other nations that we have no economic pressures of our own. In fact, we may have even convinced ourselves. Your budget this year includes a 30-percent increase for State Department operations and a 13-percent increase in foreign aid.

Mr. Secretary, the administration's budget also includes a $135 to $140 billion budget deficit. While altruism may be in our national interest, alchemy is not yet among our national talents. So something is going to have to give and I think it is unrealistic to presume these kinds of increases.

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[1] See p. 340.

The administration's budget is about $30 billion short of the deficit target. Roughly 60 percent of the cuts proposed by the President have been rejected by Congress before, and many of those more than once. While military spending gets an increase, education is cut 30 percent and the administration generally rules out taxes.

So when I see a $4 billion increase for these programs, including a $1.4 billion supplemental request for fiscal year 1987 and bigger increases for 1988, I have to ask myself how the adminstration plans to pay for all of this.

FOREIGN MILITARY SALES CREDITS

Two weeks ago, the Secretary of the Treasury appeared before this committee and we explored the financing plans within the budget. I brought up the issue of foreign military sales credits.

As I understand it, the idea is to allow global refinancing of these loans, under which you would allow countries to either prepay or defer a portion of their interest payments, making up the difference in balloon payments two or three decades down the road.

It appears to me, Mr. Secretary, that that is going to cost the United States about $1.7 billion in lost receipts just in 1987-1988. Moreover, the idea seems to rest on questionable assumptions.

First, the nations which owe us and can prepay their debt are those least in need of our aid. Why are we going out of our way to help the South Koreans when their economy is booming and South Korean exports are costing us? South Korea has not done anything to adjust their currency to help us either.

Second, the countries which would defer interest payments are supposed eventually to make good on all their financial obligations to us. While I do not want to second-guess the intentions of our allies, it does not seem likely that a country with the financial difficulties of Egypt is going to be able to pay a balloon payment of some $3.5 billion in the year 2009.

Of course, you and I will not have to deal with that crisis, but I wonder what kind of legacy this policy leaves to those who come after us.

The United States is simply not in a position to write off, forget about, or multiply our level of assistance when the Federal deficit restricts most other parts of the budget. Realism must guide us here and elsewhere in our foreign operations.

IS MORE MONEY REALLY NEEDED

We need to ask you, and I am sure you are here to tell us, do we really need more money for these programs? I have a hard time believing that a 235-percent increase in security assistance since 1981 has made us 235 percent more secure.

The doubling of foreign aid under this administration certainly has not helped our trade situation.

We are going to have to examine these requests carefully within our overall budget picture, and we are going to have to look closely at something else. Eighteen years ago, we reached agreement with the Soviet Union to build new embassies in our respective countries. By 1986, we had appropriated almost $200 million for our embassy in Moscow. The workmanship has been poor, the job is not complete, and all indications are that the walls have ears.

Last year, I, along with others, sponsored legislation requiring the Secretary of State to submit a report every 6 months to the Congress on any failures by the Soviet Union to meet the obligations to our embassy and what we have done in response. That first report is due February 1, a little over a week from now, and I am looking forward to getting a copy.

Mr. Secretary, I share your view that investments we make in our allies' security are investments in our own security, and continuing foreign aid can make good sense. But unconstrained growth in these programs is neither realistic nor affordable.

It is still early in the year and this is the time to ask questions. The key in foreign aid, as it is in all budget areas, is what is the best we can do under our financial circumstances. We will be searching for those answers in the weeks ahead, and I am sure that important negotiations take more than just a meeting; they require an overlapping interest and a process to resolve differences.

I think there is a clear set of overlapping interests. You see the need for increased spending to meet foreign policy goals. Others want increased spending to meet domestic goals. All of us want to cut the deficit and put an end to this legacy of debt.

I hope you will work with us as we attempt to negotiate a solution in all of this.

Senator Grassley.

Senator GRASSLEY. Mr. Secretary, for our side of the aisle, let me welcome you as well and emphasize again, I think, what the Chairman has already said, that Senator Domenici cannot be here.

I would ask, Mr. Chairman, unanimous consent that Senator Domenici's statement be inserted in the record.

Chairman CHILES. It will be.

Senator GRASSLEY. I have no further statement, but I will have some questions.

Chairman CHILES. Thank you.

[The prepared statement of Senator Domenici follows:]

OPENING STATEMENT
SENATOR PETE V. DOMENICI
HEARING ON THE PRESIDENT'S FY 1988 BUDGET REQUEST
HON. GEORGE P. SHULTZ, SECRETARY
DEPARTMENT OF STATE

JANUARY 23, 1987

MR. SECRETARY, WE ARE PLEASED TO JOIN IN WELCOMING YOU TO YOUR FOURTH YEAR OF TESTIMONY BEFORE THE COMMITTEE. I LOOK FORWARD AGAIN TO YOUR CUSTOMARY THOUGHTFUL AND CANDID TESTIMONY.

YOUR TASK THIS YEAR IS ESPECIALLY DIFFICULT. YOUR PREVIOUS POLICY AND RESOURCE ACHIEVEMENTS HAVE BEEN SOMEWHAT OBSCURED IN RECENT MONTHS. LIKE MANY OF US GETTING IN TO WORK TODAY, YOU HAVE HAD PATHS TO CLEAR AND ROUGH ROADS TO NAVIGATE.

WHILE THIS COMMITTEE WILL FIND IT EXTREMELY DIFFICULT TO PROVIDE ALL YOU ASK AND STILL PRODUCE A BUDGET CONSISTENT WITH THE GRAMM-RUDMAN-HOLLINGS TARGETS, YOU ARE ENTITLED TO THOUGHTFUL CONSIDERATION OF YOUR CONCERNS ABOUT A POSSIBLE THIRD CONSECUTIVE YEAR OF CUTS IN THE FOREIGN AFFAIRS BUDGET.

MR. SECRETARY, I KNOW YOU ARE A PRUDENT AND WISE MAN. IN YOUR TESTIMONY TODAY, YOU MAKE SOME SIGNIFICANT CLAIMS. ON PAGE 5, YOU STATE THAT "THOSE WHO WOULD CUT THE FOREIGN AFFAIRS BUDGET EVEN FURTHER ARE GAMBLING NEEDLESSLY WITH OUR NATION'S FUTURE. IN SHORT, BY ATTEMPTING TO SAVE THE COUNTRY SOME DOLLARS OVER THE SHORT RUN, THESE CUTS THREATEN TO COST US MORE--IN MONEY, IN JOBS, EVEN IN LIVES--OVER THE LONG RUN".

IN ORDER TO CONVINCE US OF YOUR POSITION, YOUR TESTIMONY SHOULD BE SPECIFIC AND GRAPHIC. WHAT DID WE BUY WITH THE GENEROUS INCREASES IN FOREIGN AID AND STATE DEPARTMENT OPERATIONS BETWEEN 1982 AND 1985? AS YOUR BUDGETS BEGAN TO CONTRACT OVER THE PAST TWO YEARS, HOW HAVE YOU REALLOCATED PRIORITIES?

HAVE WE IN FACT NARROWED THE GAP BETWEEN OUR INTERESTS AND OUR RESOURCES BY DETERMINING WHAT INTERESTS ARE LEAST VITAL TO OUR NATION? ONCE YOU HAVE CONVINCED US THAT THE FOREIGN AFFAIRS AGENCIES HAVE DONE EVERYTHING POSSIBLE TO LIVE WITHIN THE FISCAL CONSTRAINTS THAT AFFECT THE ENTIRE FEDERAL GOVERNMENT, YOU WILL HAVE AN ATTENTIVE AUDIENCE FOR YOUR PROPOSED INCREASES.

I SHALL RAISE ONLY ONE CONCERN OF MY OWN AT THIS TIME: THE LACK OF SUSTAINED, EFFECTIVE SUPPORT FOR THE EMERGING DEMOCRACIES IN LATIN AMERICA AND THE CARIBBEAN. I CANNOT UNDERSTAND WHY CONGRESS AND THE EXECUTIVE BRANCH FAIL TO BUILD UPON THE APPARENT BIPARTISAN SUPPORT FOR ECONOMIC AND HUMANITARIAN AID TO OUR NEIGHBORS. AS YOU MENTION IN YOUR TESTIMONY, OUR EXPORTS TO THE REGION DROPPED BY OVER $11 BILLION BETWEEN 1981 AND 1985, BUT ONLY 14 PERCENT OF OUR ECONOMIC AID GOES TO COUNTRIES IN THE WESTERN HEMISPHERE. THAT DOESN'T MAKE SENSE TO ME.

MR. SECRETARY, THIS SHOULD BE AN INTERESTING SESSION.

Chairman **Chiles**. Mr. Secretary.

STATEMENT OF HON. GEORGE P. SHULTZ, SECRETARY OF STATE

Secretary **Shultz**. Thank you, Mr. Chairman, members of the committee. I appreciate the chance to appear before you and explain the request of the President for the funding in the 150 account. I believe this is a very tight request and is fully justified, as is the supplemental that you mentioned in your opening comment, Mr. Chairman.

I have prepared a lengthy statement that goes through the various requests and develops the rationale for them, and with your permission, I would like to put it on the record of the committee and not take up your time reading through it; it would probably take me about an hour.

Chairman **Chiles**. We will be happy to put that in the record in full.[1]

We thank you for your indulgence in that. It does give us more time to have a dialogue with you.

Secretary **Shultz**. That is what I am looking forward to, so what I would like to do is just talk a little more informally about the overall picture, as I see it, and the purposes that are served by this budget.

BUDGET SERVES OUR SECURITY INTERESTS

I think the first purpose, as you mentioned, that we have to have in our minds about this budget is that it serves our security interests. We are a country with global interests and global responsibilities, so we reach out around the world, and we do that in terms of our trade, in terms of our ideas, and also in terms of our security arrangements.

That means that we need to have allies, and it means we need to have people who work with us. It is a lot less expensive for us to have people working with us than to have to do these jobs all by ourselves.

Some of our allies are wealthy enough to provide bases for us and airfields and ports, and so on, and they provide the expense for them, as in Japan, Germany, Italy, the United Kingdom, and other countries. So we need to work with those allies through our diplomatic efforts.

Others are not as able to finance their own efforts to improve the modernization and capability of their security forces. But, nevertheless, access to bases and improvement of those forces is very much in our interests.

Therefore, we have the so-called base rights countries, such as Spain, Portugal, Greece and Turkey, where we have very important interests at stake. In the development of those rights, we have a negotiation and we get certain rights.

We undertake our best efforts to help to develop those bases and the infrastructure around them, and so on. So we have requests in our budget to support these security interests. These requests area, relatively inexpensive way of supporting the security of the United States.

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[1] See p. 354.

I believe it is very important that we are able to follow through on the arrangements that are made. It not only has to do with our security, but it also relates to our dependability.

I am sorry to have to sit here and tell you that as we look at these base rights countries, we have, for example, Spain where, in the budget for the fiscal year we are now in—and this is one of the reasons why we are asking for a supplemental—we have a shortfall of about 73 percent.

Now, we have an outstanding ambassador in Spain, Reg Bartholomew. Some of you probably know him, a terrific, experienced ambassador, and he is in the midst of negotiations for the new base rights arrangements that will pick up when the current agreement expires.

How would you like to be the negotiator and have that hand to play? He will play it well, but it is an example, and there are many others.

So the first purpose that we try to serve in this budget is our security interest, and the severe shortfall from our request in the fiscal 1987 budget. We have tried to restore some of it, partially, in the supplemental and, of course, in the 1988 budget. That is reason number one.

BUDGET NECESSARY IN SUPPORT OF PROSPERITY

Second, we think this budget is necessary in support of the prosperity of the United States. Whatever problems we may be having in our export-import balance, it is clear to all of us that we are very much a part of the world economy and that there is a genuine world economy in the sense that no nation stands outside of it.

It is dramatically true in the world of finance. As the saying goes, I think, quite accurately, we do not have a gold standard or a dollar standard anymore; we have an information standard, and when new information becomes available it ricochets into these markets and we see results, but it is on a world basis.

We are very much a part of this world economy, so we have a stake in how well it works and in the prosperity of other countries. We know how important our exports are to us, and the rough rule of thumb, I believe, is something like 26,000 jobs for every $1 billion of exports, more or less, depending upon what the export is.

We know that one of twenty jobs in manufacturing is devoted to exports. I think something like two out of five acres of farmland is devoted to exports. It is a big thing. It is interesting to note that in recent times, roughly 40 percent of our exports have gone to so-called developing countries.

Many of these countries have been having severe problems, and we have been trying to help with ideas about how to conduct economic development more profitably. We have been seeing great changes in people's thinking about the right way of economic development.

We have been trying to help with the problems that they have in terms of their resources. We know very well that many have had great difficulty in importing because of their debt problems. These are quite severe in many cases, and one of the reasons why our exports have declined, and have declined drastically to some of these countries, is just what has happened to their economies.

You mentioned Secretary Baker appearing here earlier. He has come up with the so-called Baker Plan, very well received around the world, and it is a sound plan. One of its key components is financing coming from the multinational banks, the World Bank, the IDB, and so forth.

And yet our contributions in fiscal 1987 are cut by a third just as we are getting this plan off the ground. So in one way or another, this budget is to contribute to a better world economy, and that is very much in the interests of prosperity of the United States economy. So that is reason number two—security, prosperity.

DEMOCRACY IS RULE OF LAW

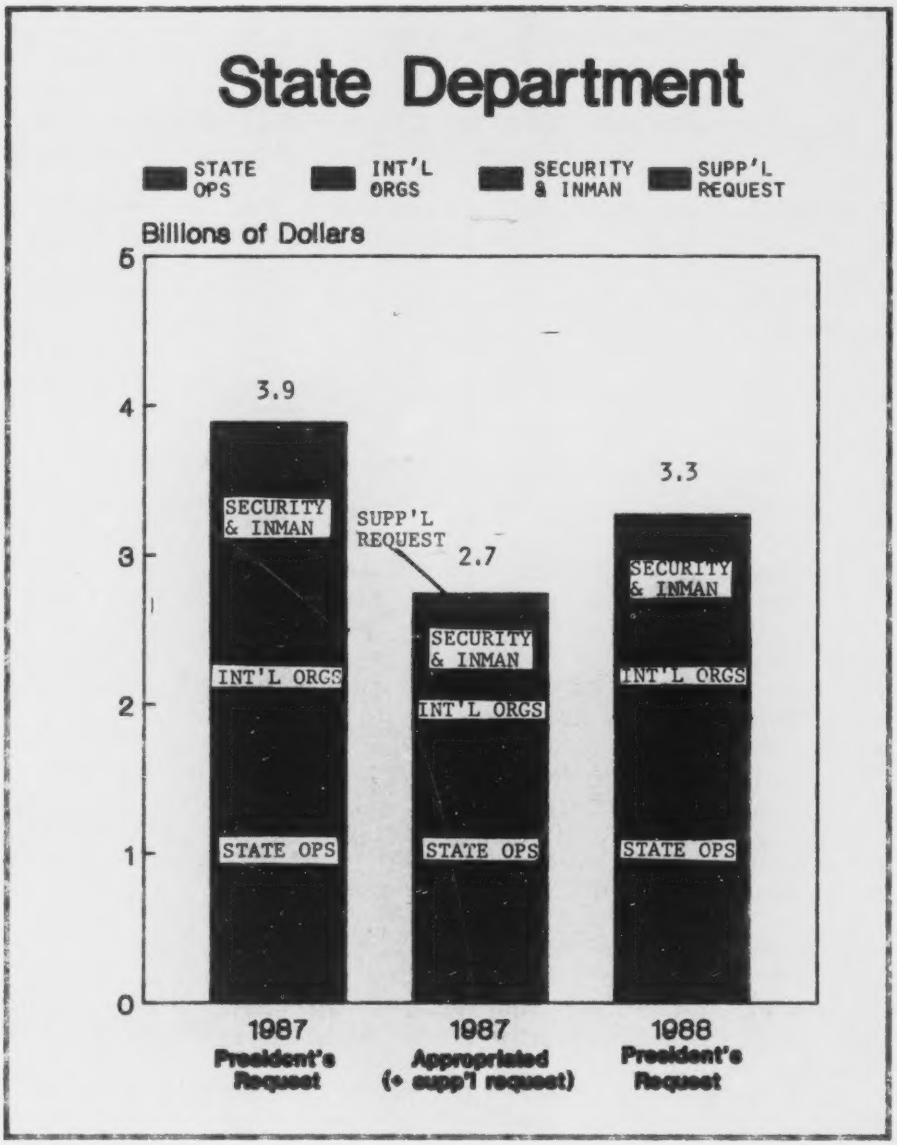
A third goal that is embedded in this budget is democracy, the rule of law. It is very much in the interests of the United States that countries around the world have societies that are more open, more responsive to the will of the people, recognizing that forms of government vary and each country designs its own; there is no model you can impose everywhere.And we do see a definite trend in that direction that I think is one of the most encouraging things that we see in the last decade. We see it in our own hemisphere, we see it in Central America; we have seen what has happened in the Philippines. It is very much in our interest to support that.

Countries that are democratic tend to be more stable. They tend to be more ready to have the kind of economic policies that will lead them to prosperity and development, and democratically based countries tend not to be aggressive militarily, so it provides for greater stability. That is in our interests, and we need to be helpful.

These democracies are often quite fragile. For example, in some of the South American countries the drug trafficking and terrorist problems that they face in upholding those democracies are severe and we need to help. Well, I will just give an example, the Dominican Republic. Our ambassador, as his Merry Christmas and New Year's greeting, went into the government of the Dominican Republic and had to tell them, first of all, that their sugar quota was cut in half.

This is a country that historically has shipped sugar to the United States. Their quota was already way down from their historic levels, but it was cut in half. That amounts to something like $46 million of foreign exchange for them.

As you can see from the chart, compared with our request it went down about 40 percent, 39 percent, $48 million, in our assistance. That is partly economic assistance, partly military assistance.


State Department
STATE OPS
INT'L ORGS
SECURITY & INMAN
SUPP'L REQUEST
Billions of Dollars
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STATE OPS
SUPP'L REQUEST
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SECURITY & INMAN
INT'L ORGS
STATE OPS
3.3
SECURITY & INMAN
INT'L ORGS
STATE OPS
1987 President's Request
1987 Appropriated (+ supp'l request)
1988 President's Request

Secretary SHULTZ. This is a country that shares an island with Haiti. I think we are all very pleased and glad to be a part of getting rid of a dictator in Haiti, but it is a very poor country and it is very much in our interest to see a more stable form of government come forward there.

Let me remind you about the Dominican Republic, just to give an example of what apparently happened when push came to shove.

It was only a couple of decades ago that President Johnson sent 20,000 U.S. troops to the Dominican Republic. It turned out to be a very good move and a constructive thing, and out of that has come a democratic form of government, very much in our interests—democratic in the sense that it has changed control from one party to another, and so on, so it has stood that test. So that is good for us; we should be helping them. That is an example.

MORE NEEDED FOR NARCOTICS-RELATED PROBLEMS

Now, I have mentioned narcotics. It is a terrible problem. I do not have to convince the members of this committee of that, and I would say that the funding for our part of the effort on narcotics has been good in the fiscal 1987 budget, particularly with the amendments, and we feel that we get good support and good funding.

However, it is not anywhere near enough to fund things that are directly narcotics-related, like crop eradication and things of that kind, because if all you do is eradicate crops, you do not really change the situation that produces those crops in the first place; you do not provide alternatives.

So in order to deal effectively with the problem, you have to be of some assistance to the country in switching over from one crop to another or another kind of economic activity.

Bolivia is a case in point where we had a very effective operation that worked in cutting down on the growing and marketing and processing, and so forth, there. But we are having a very hard time following up and preventing the situation from going back to where it was.

So fighting drugs is more than just the direct drug business. You have to address the environment, and our assistance is designed to help do that.

PROGRESS BEING MADE WITH TERRORISM

Unfortunately, Mr. Chairman, I must also focus on the problem of terrorism. That is a problem Americans face and our friends face around the world, and we have vivid reminders, unfortunately, practically daily.

We have made a great deal of progress in this. People around the world are much more aware than when we started our efforts. It was heartening, for example, to see in the statements made at the Tokyo economic summit very direct statements on this subject in identifying Libya, for example, for what it does, people stepping up to this, the rule for law coming to take its place in doing this.

We have programs that work with other countries that help train, help develop a capacity to share intelligence and work on the problem, and they are effective. Last year, we had about 120 terrorist incidents that would have taken place but did not because we found out about them and, in one way or another, working with friends, those were things that did not happen.

But we have to continue that effort and we have to help our people in our embassies to protect themselves and protect those structures, and it was with that in mind that this building program that you referred to has come forward.

I might say also that we are heavily dependent on the reporting and analysis that comes from our regular Foreign Service officers' reporting. Most of what the U.S. Government uses on what is going on around the world comes from that. So when we find it cut down, we are hurting ourselves in this regard.

We have had some build-ups in personnel. Unfortunately, most of it has been for service activities, particularly for providing security. The kernel of what we are trying to do is our basic representative function.

I do not know whether the committee members are aware of the fact that ofthe people in a typical embassy, less than 30 percent are State Department, and a pretty good fraction of those people in the State Department are engaged in the housekeeping functions that we have to do, providing the security, the buildings, the communications, and so on, for people to do the work they came there to do.

MAINTAIN STRENGTH OF DIPLOMATIC FUNCTION

We need to maintain the strength of our diplomatic function and not have it appear that what the United States is there for are things other than our diplomatic representation and our economic interests.

We are in the process of closing consulates. We closed seven last year; we have another seven scheduled. With the kinds of budget cuts that some people tell me we are going to have, we will have to close them by the 10s and 20s and 30s and 40s.

Right now, we are in a crisis in our consulate in Frankfurt. Frankfurt, West Germany, what a city and how important it is. Pick up the phone, Mr. Chairman, and call your friend, Mike Mansfield, and ask him how it is in Tokyo right now.

WAR OF IDEAS

Finally, I would like to say that there are some other things that are very important where we have made headway and which we cannot neglect.

We are engaged in an important war of ideas in the world and we are winning.

We have the better ideas, but we have to put them forward, and the USIA and VOA, and so on, have been developing, I think, extremely well.

But with the funding we have had, we have had to cut way back. I will just give you a couple of comparisons.

We have in the VOA six so-called super transmitters, and we are trying to develop more. We broadcast in 42 languages now. The Soviet Union has 37 of these big transmitters and they broadcast in 80 languages.

These are not big bucks in terms of the numbers that all of you in the Budget Committee think about all the time, but this is an area where relatively small amounts of money in the war of ideas can make a big difference.

MAJOR REFORM IN U.N. BUDGETING PROCESS

Similarly, with a lot of action in the Congress, the Kassebaum amendment, and so on, we have really been taking it to the United Nations that their budgeting practices are not tolerable to us.

So this fall, we have finally gotten a major reform in the UN budgeting process that involves both substantive cuts of important dimensions and a different process, a so-called consensus process. In other words, they cannot put a budget forward unless we agree to it, so we no longer face the prospect that votes of countries that do not contribute anything much to the budget will count for as much as our vote does.

So that is an extremely important reform, and I think we must follow up on it by going back and funding the amount that is called for by our treaty obligation. We have a treaty that obligates us to do certain things.

I think it is essential that we do not deviate from living up to commitments that we have made. I used to be Secretary of the Treasury, as you know, and at least when I was there Alexander Hamilton's portrait hung in the office.

You learn that one of the things Alexander Hamilton saw when he entered office was that we had a lot of paper out as a result of fighting our revolutionary war, continental paper, and he found that it was selling for 35 to 40 cents on the dollar, as people wondered what this new country was going to be worth.

He decided that he should be ready to redeem at 100 cents on the dollar. He said if this country is going to stand for anything, the full faith and credit of the United States must be without question. When we make a commitment, we live up to it.

So I think we have to do that with the U.N., and so that means, first, doing something about the Kassebaum amendment. We think there are a few places left in the U.N. where we can stand a little pressure remaining, but basically this has been a magnificent reform, and after we have done that, to change our request so that we meet our obligations and, in the meantime, fully fund what we have asked for.

RESPONDING TO HUMANITARIAN PURPOSES

One other thing, Mr. Chairman. There is money in this budget for humanitarian purposes, and you suggested in your opening comments that maybe people who expect charity out of us have not looked at our budget picture.

I believe one of the most wonderful traits about America is its generosity, its willingness to respond to the real misfortune that somebody has, and the responsiveness often is not in a budget, but comes about when something happens and we respond to it.

This country responded to the drought in Africa magnificently, and I am proud of it; it is humanitarian. I have emphasized all through here how this budget serves our national interests, but I think there is nothing wrong in having a little humanitarian concern when people are really in need. So our response in Africa, I think, was laudable.

Our efforts to help stem the potentially very tough plague of locusts that was threatening in Africa, getting in ahead of the curve a little bit—I think that is laudable. Our efforts with refugees, which has gotten bipartisan support—since 1980, we have had over 500,000 people come into the United States. We have given support to refugee organizations. I think it is a good thing; we can be proud of it.

Furthermore, the history of our country, we all remind ourselves, is one in which we have benefited immensely from the people that have come here as refugees in one form or another and wound up contributing a great deal to us.

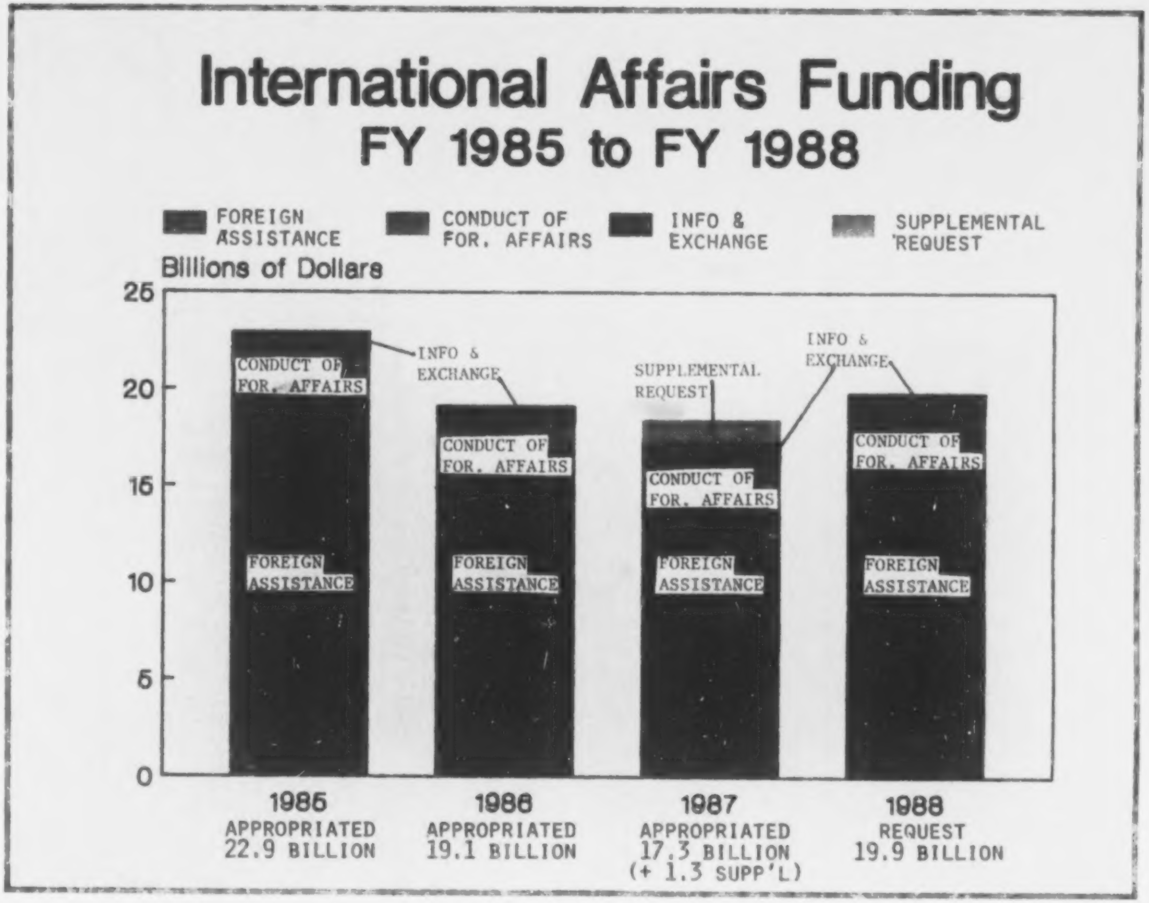
So there is nothing wrong with a little generosity; there is nothing wrong, when there is a volcanic eruption in Colombia or an earthquake in El Salvador or in Mexico, in being willing to say, boy, my brother is in trouble and I ought to be willing to help. That is not basically what our budget is about.

It is very popular always to say we should not do anything except that which serves our interests directly, and I think we have to be guided by our interests, but there is nothing wrong with being a little generous when somebody is in need.

DEPARTMENTAL FUNDING LEVELS

Now just quickly in terms of the numbers, here is where we were in fiscal 1985. We were appropriated $22.9 billion.

Here is what was appropriated in fiscal 1986; it goes down to $19.1 billion. I do not feel like I have been increased. 1Here is what happened to us in fiscal 1987. We are down to $17.3 billion. This little yellow sliver is what we are asking for in the supplemental; the request was much more. And this is our request for this year; it is considerably less than the request for fiscal 1985.



International Affairs Funding
FY 1985 to FY 1988

Chairman **Chiles.** But, Mr. Secretary, before we go too far in comparing these funding levels, I think you have to face up to the fact that you asked us, and the Congress responded, for a $2.25 billion supplemental in 1985 for the Middle East.

You told us at that time it was a one-shot affair, we gave you that money, and now that is your baseline. That is something of a bad comparison to make now when we responded and gave you——

Secretary **Shultz.** Even if you deduct that—and I have not noticed many wanting to cut our support for Israel lately—but even if you deduct all that, we are still down.

DEVALUATION OF DOLLAR ADDS TO BUDGET

But let me add on to the problem that we face.

There has been a gigantic currency rearrangement in the last year or so, and in Europe and in Japan it is very large. So your friend, Mike Mansfield, gets your appropriation cut in dollars and he has to spend a lot of that in yen.

Chairman **Chiles.** Mr. Secretary, you are blaming us for the currency devaluation.

Secretary **Shultz.** I am not. Chairman **Chiles.** I thought of the Secretary of Treasury is the one who forced the dollar down. He comes and applauds himself and the administration for forcing the dollar down.

Secretary **Shultz.** I am not blaming or applauding anybody on the yen-dollar relationship. I am just saying that when you look, with your responsibility now to look at this budget, at the need we have for a well-functioning embassy in Japan, with consulates, the fact that our dollars do not go very far is a fact you have to take into account.

Chairman **Chiles.** Absolutely, absolutely; it is a fact of life. But when the right hand of the administration forces something down, the left hand has to recognize the right hand did that and not say that is our fault.

Secretary **Shultz.** Mr. Chairman, I did not say it was anybody's fault.

Chairman **Chiles.** Yes, sir.

Secretary **Shultz.** I did say that if you are the guy or the woman who is running that embassy there in Japan or Germany or the UK or wherever, you have had a change in the currency rates.

What I am getting at is the currency business is a reduction, and then you have got an additional reduction. I am not complaining about it. I am just pointing out the impact.

CUTS/EARMARKED FUNDS CAUSE POLICY PROBLEMS

You have a budget, and here we are talking about $19 billion. Now, a little over $5 billion of that is Israel and Egypt. There are quite a few other elements in this budget that are, so to speak, earmarked; in other words, they do not get cut.

So when you cut us, say, 20 percent or something like that, as you did last year, there is a fair proportion of this budget, almost half of it, that does not receive any of that cut. That means the whole cut goes into other places. That is why we have these big numbers in percentages here. So a lot of it is cut in half.

Well, maybe I have talked enough and you want to get at me. [Laughter.]

But there is one—I hope I am getting across the point that I think these funds are well spent for purposes that serve the interests of the United States, and we have had some rocky times in trying to keep ourselves afloat.

We are having to close down, withdraw. This is no time for the United States to be withdrawing from the world. Our ideas are making great headway. This is the time when we should be moving forward, not back.

But with the kind of restrictions on resources we are feeling, there is nothing else for us to do, and I hate to be the person administering that process.

So that is my pitch to you, Mr. Chairman. I understand about the budget, and I will be glad to have my understanding increased by your comments, but I have to look at my little piece of it.

It is less than 2 cents on the dollar of the budget you are dealing with, so all I can say is for the interests of the United States around the world, all we are asking for is our 2 cents' worth.

Chairman **Chiles**. Mr. Secretary, you ask for that as eloquently as anybody possibly could, and I and this committee have the greatest respect for you, the job you are doing and, certainly, for the way you articulate the problems.

I do not take issue, with any of the facts that you have given us and the needs you have pressed upon us.

ERADICATION OF DRUGS

As I listen to what you say, I wish you were speaking for some of the other parts of the budget. You mentioned the tremendous need to do something about the eradication of drugs and our need to support our allies who are serious about doing something about the drug problem.

This committee and this Congress have tried to respond energetically to those needs. We have similar needs in this country. You went on at great length about the need to keep our word; our word needs to be good; we should not renege on our word in the United Nations or with our allies.

That same rhetoric should apply to not reneging on our word to the American people. Last year, we passed a major drug initiative, and we all took a great deal of credit for it.

This year in the budget before us, the money for that drug initiative to be spent in the United States and the money to block drugs coming into the United States has been cut 50 percent. Now, that is reneging on your word, and that is with your own people.

If you should not renege on your word with your allies, you should not renege on your word with the people we promised to do something for the first time about education in drugs on the demand side. That money is cut 50 percent.

We are going to do something about rehabilitation to provide treatment for someone who wants to get off of drugs. That money is cut 50 percent.

We are going to do something about interdiction by Customs and the other areas. That money, we find, is cut, as well as the money for local law enforcement.

So as we listen I wish in some way you were speaking for more than the State Department side because I think you are right; we should keep our word. It is tremendously important that we do it with our allies; it is equally important that we do it with our own people.

[The prepared statement of Secretary Shultz follows:]

STATEMENT BY

THE HONORABLE GEORGE P. SHULTZ

SECRETARY OF STATE

BEFORE THE

SENATE BUDGET COMMITTEE

JANUARY 23, 1987

Mr. Chairman and Members of this Committee:

Today's presentation supports the President's fiscal year [FY] 1988 budget request for the international affairs function -- budget function 150. I take it as an opportunity to convey to you my deep concern about a major foreign policy crisis we are in danger of creating for ourselves. It is the danger of missing important opportunities to advance the interests of the United States because of rapidly diminishing resources committed to international affairs.

The fact is, we cannot remain a first-class world power by committing fewer resources to our foreign relations than our adversaries. Nor can we maintain our political, economic and humanitarian values in a dynamic and threatening world environment through the strength of our military power alone.

As we face the third consecutive year of sharp cuts in our foreign affairs budget I am concerned that the U.S. -- through a series of reductions in people, facilities and programs overseas -- is mindlessly creating for itself a strategy of retreat. This budget crisis is perhaps the most urgent -- and least recognized -- foreign policy challenge facing our nation today.

I think all Americans can agree on the broad goals of our foreign policy. Put simply, they are to protect our national security, to promote our domestic prosperity, to foster democratic values, to advance our humanitarian ideals, to combat narcotics trafficking and to thwart terrorism.

Over the last six years, this Administration has worked hard toward these objectives. We have made substantial progress toward reinvigorating our economy, restoring our military strength, and strengthening our ties with allies in Europe, Asia, Latin America and elsewhere. It has involved a lot of unspectacular but vital spadework -- day-by-day management of our policies by the men and women of the foreign affairs agencies.

As a result of these efforts on behalf of President Reagan's policies, our European alliance is strong and vital. In NATO, American efforts to advance peace and progress abroad have been buttressed by a new sense of vitality and common purpose. We have also built a network of strong ties in Asia -- relationships that will be crucial to global prosperity and regional security well into the next century.

Through firmness and realism, we have embarked on a new high-level dialogue with the Soviet Union -- not just on arms control, but on the full agenda of issues that divide us. And for the first time in history, we now have the prospect of negotiating substantial reductions in the nuclear arsenals of both sides.

In the developing world, we have worked to support a remarkable surge toward democracy, most notably in Latin America, where the percentage of the population living under freely elected governments has grown from 30 percent in 1979 to more than 90 percent today. Democracy has also made great strides in the Philippines, in the Caribbean, and throughout the Third World. More and more people seem willing to resist authoritarian or military governments and the yoke of totalitarian oppressors; they seek and deserve our help.

We have also seen an encouraging trend toward free market-oriented solutions to the problems of economic growth. We now find, almost everywhere in the world, movements to decentralize, deregulate and denationalize. At the UN Special Session on Africa last May, the African nations committed themselves to more open markets and less state intervention. Even in the communist world, reforms in China demonstrate a growing recognition that entrepreneurial initiative in a market environment is the engine of development and growth.

All of this represents important progress. But there is still much to be done. Precisely because foreign affairs issues do not lend themselves to quick fixes, Americans have to be prepared to tackle them on a steady, long-term basis. Yet just as we should be consolidating and building upon our recent gains, we stand on the threshold of a major reversal brought about by penny-wise, pound-foolish budget decisions.

Last January, President Reagan submitted to Congress an international affairs budget for FY '87 that represented a sound and prudent investment in our national interest. The total request amounted to less than two cents on every dollar in the proposed federal budget, which itself was within the new Gramm-Rudman ceilings. Yet Congress proceeded to cut that request by over 20 percent, reducing our operating base by $1.8 billion. After accommodating earmarked items which had to be funded, the effective cut for the bulk of our operations was more on the order of 50 percent. This was on top of the $1.5 billion cut from prior year levels which we suffered in the FY '86 Congressional appropriations process, meaning that over the past two years, we lost over $3.3 billion from the resources we were operating with in FY '85. These cuts were more severe, in percentage terms, that any other function in the President's budget requests.

These cuts threaten our vital interests not just in one or two regions, but around the globe. They threaten the stability of our allies. They threaten our war on drug traffickers and on terrorists. They threaten our attempt to promote democratic values and reforms. They threaten our efforts to expand and develop trade. And they threaten our ability to pursue a coherent foreign policy by undermining our foreign affairs infrastructure and weakening our career Foreign Service. In short, by attempting to save the country some dollars over the short run, these cuts threaten to cost us much more -- in money, in jobs, even in lives -- over the long run.

The President's foreign affairs budget might usefully be looked upon as a form of national insurance. In asking the Congress to devote only two cents out of every budget dollar to our foreign policy goals, the President has determined the minimum premium we must pay as a people to safeguard the peace and lead the free world. Those who would cut the foreign affairs budget even further are gambling needlessly with our nation's future.

No one can say for sure how large the gamble will be. We know we pay some price every day in terms of lost opportunities to influence events. Perhaps a crisis that could have been averted today by timely and relatively inexpensive security or economic assistance, or through diplomatic efforts, will explode in our faces the day after tomorrow. Then the terrible words of Thomas Hobbes will come back to haunt us: "Hell," wrote Hobbes, "is truth seen too late."

In just a moment, I will try to give you examples of the real damage this nation could inflict on itself if the President's supplemental and FY '88 requests are not passed. First, however, let me tell you what we are asking for.

Budget Overview

For FY 1988, the President's budget request for the International Affairs function is $19.1 billion. Because this is a net figure, the total appropriations request is $19.6 billion, about $1.6 billion below our FY 1987 request. Of that amount, $15.2 billion is for foreign assistance. Just about half of this goes for a few major commitments. As in the past, the largest single component is the $5.3 billion for Israel and Egypt -- 35 percent of the total, while assistance to 4 NATO Allies -- Spain, Portugal, Greece, Turkey -- and the Philippines -- accounts for $2.1 billion, or 14 percent. Central America and the Caribbean represent $1.4 billion, or 9 percent of the request. Of the remainder, assistance to Pakistan, Thailand, Kenya, Somalia, Tunisia, Jordan and Morocco take another $1.2 billion, or 8 percent. Our request for

Africa is $895 million, or 6 percent of the total. All other country programs constitute $1.2 billion, or 8 percent of the total resources requested.

In addition, the foreign assistance account includes $1.8 billion in contributions to the multilateral development banks, or 12 percent of the total; and the remaining $1.3 billion, or 8 percent, for such items as AID non-country programs, voluntary contributions to international organizations and programs, narcotics control programs, the Peace Corps and refugee assistance.

The remaining $4.7 billion we seek in 150 appropriations finances the operations of the Department of State, USIA, and the Board of International Broadcasting. Out of this sum, we also pay our assessed contributions to international organizations, contributions to UN peacekeeping activities, and U.S. participation in multilateral international conferences. Finally, we seek a direct lending program of $1 billion for the Export-Import Bank.

Mr. Chairman, while I realize this is not within the specific jurisdiction of this Committee, I think it is important to note that we are also seeking, on an urgent basis, $1.3 billion in supplemental funds in FY 1987. This is the minimum amount necessary to protect our core interests until the completion of the FY 1988 budget process. The supplemental funds will help meet critical unexpected needs, major shortfalls from absolutely essential projects where there are firm commitments to key allies, and projects which Congress has asked us to consider and fund. A package of budget offsets has been submitted to accommodate this supplemental request.

As a former budget director, I know first-hand the difficult and painful decisions you face in attempting to reduce the federal budget deficit. It is a goal strongly shared by the President and me. This budget reflects a number of painful choices we had to make as part of our contribution to the deficit reduction target. We had to pare down and even eliminate programs which, under other circumstances, would have great merit. Our proposed program level for the Andean countries, for example, is far below the optimum when you consider our interests and their needs. In Korea, rather than a brusque cut-off from a large FMS credit program, it would have been helpful to provide some transition to strict commercial terms. I could cite many other examples of programs cut substantially below the amount my program managers considered necessary. The point is, Mr. Chairman: this budget is not a wish list. At each stage of the budget review process we asked this question: How can we justify these investments in an age of fiscal restraint? I hope my testimony will answer that question to your satisfaction.

My colleagues and I recognize that we will not get very far without the cooperation of the Congress. We are committed to work with Congress. We welcome your close scrutiny of our budget proposals, and we will do our best to respond to all of your questions in a forthright and timely manner.

Let me now provide you with some concrete examples of how our resource requests help promote our objectives.

National Security

Let's start with our national security. We live in a dangerous world, and we face the choice of defending ourselves alone -- and, I might add, at tremendous cost -- or working with allies who share our values and who face the same enemies we do. We have chosen the latter course.

Our country's alliances are based on a sharing of risks and responsibilities. The Soviet challenge is global. Its military machine stands poised down the middle of Europe, pursues its invasion of neighboring Afghanistan, and actively arms and supports repressive regimes in Eastern Europe, Indochina, Ethiopia, Cuba and Nicaragua.

Some of our allies, particularly in the developing world, lack the resources to provide for their own security concerns while simultaneously responding to the basic economic needs of their own people. Because we know they must do both if they are to survive and grow, we must help them finance the modernization of their armed forces. Over the years we have made commitments to do so. Yet the resources made available this past year fall far short of these commitments. For example, in FY'87 we have had to slash aid to Spain by 73 percent. The story is repeated for Portugal, Turkey, Greece and even the Philippines, where we had to reduce the military assistance program by 50 percent.

Such reductions raise fundamental doubts about U.S. dependability, and risk the loss of vital military and port facilities. Without these allies and their facilities, we would have to spend a great deal more on defense, and have many more of our citizens under arms. We are therefore requesting $2.1 billion in security assistance to the base rights countries to help modernize their military forces, and -- for Portugal, Turkey and the Philippines -- to assist them in dealing with their economic problems.

A region especially crucial to the United States is the Middle East. We want to support the Arab-Israeli peace process, check the spread of Soviet influence, and maintain free access to Persian Gulf oil. Our security and economic assistance programs to Israel and Egypt play a key role toward achieving these objectives. So, too, does assistance to close friends such as Tunisia, Jordan and Morocco. Our 1988 budget requests seek $200 million in military and economic assistance for these three countries.

Another key ally is Pakistan, which has voiced its strong opposition to Soviet aggression in Afghanistan and which is now host to nearly 3 million Afghan refugees. Our support for Pakistan is indispensible if it is to continue to bear the enormous economic burden of the Afghan refugees and to negotiate firmly for Soviet withdrawal. For FY 88 we are requesting $678 million in economic and military assistance to Pakistan.

Central America is of vital importance to the United States because of its geographic proximity and strategic position. The Soviet Union, through Cuba and Nicaragua, is seeking to extend its influence by supporting guerrilla and subversive groups in Central America. U.S. policy in the area seeks to counter the challenge by promoting security, democracy, economic development and social reform. We are asking for $1.4 billion to cover these costs.

Fortunately, massive expenditures are not needed everywhere; sometimes, relatively modest sums suffice. In the South Pacific, for example, we have an opportunity to strengthen our ties with the region's nine independent nations and at the same time put effective limits on expanding Soviet influence. While the Soviets have made inroads in the region, especially in the area of fisheries, where for a mere $1.5 million Moscow has acquired or is attempting to acquire fishing rights in Kiribati and Vanuatu, a small commitment now on our part will give the region the western, pro-democratic, free enterprise alternative it clearly prefers.

Supporting global measures for peace also obliges the United States to play an active role in the United Nations. In recent years, we have sought to use our influence to make the UN a more efficient, effective organization. Last month, the UN General Assembly enacted by consensus a far-reaching set of reforms. In addition to their inherent importance, these reforms will provide the basis for rebuilding broad-based U.S. support for the UN as a genuine forum for conflict resolution. Now it is incumbent on us to return to a funding status consistent with our size, commitments and responsibilities.

Finally, the key to all our efforts to work with governments around the world is the institution of the Department of State. As a result of budget cuts made to date, the infrastructure of this Department is threatened. We must reverse the personnel reductions at home and overseas. And we must provide the technology and support for our worldwide operations. If we do not, we will have less understanding of developments abroad, less ability to influence those developments, and insufficient resources to gain support for policies serving our interests.

Promoting U.S. Prosperity

Let me turn now to the second great goal of U.S. foreign policy: promoting domestic prosperity. Americans usually suppose that their prosperity is largely determined by the monetary and fiscal policies we pursue at home; the fact is, however, that economic conditions abroad are having a crucial impact on the health of the American economy. About 40 percent of our exports go to the developing countries. The accepted rule of thumb is that $1 billion of exports is equivalent to about 26,000 jobs. The developing countries have accounted for more than half of the growth in U.S. exports since 1975. Approximately 1 out of every 20 workers in our manufacturing plants and 1 out of every 5 acres of our farmland produce for Third World markets. I might add that 2 out of every 5 acres of our farmland produce for export. That's how interrelated our farm community is with the international community.

Current economic stagnation of a large number of developing countries has vividly -- if painfully -- highlighted these relationships. For example, between 1981 and 1985, the countries of Latin America and the Caribbean experienced a sharp decline in their real incomes. Our exports to that region during the same period dropped by over $11 billion -- equivalent to almost 300,000 jobs. In Africa, our exports dropped by $1.5 billion. That's another 40,000 jobs. There's a direct correlation.

It has long been obvious that by promoting economic development we make a direct contribution to our own nation's economic well-being. For example, in 1960, Turkey's per-capita income was about $500; Pakistan's was barely $100 per year. By 1985, both countries had more than doubled their incomes and had become major purchasers of U.S. products. Since 1979, U.S. exports to Pakistan have doubled; to Turkey they have nearly quadrupled. So I think you can see a hard interest which is served, over time, in generating markets by our assistance programs.

I hope these illustrations make clear that in order to promote our own long-term economic prospects, we must promote economic growth in the developing countries. It was with such ends in mind that we initiated a comprehensive plan -- the Baker Plan -- to get developing countries on a path of sustained economic growth. The Baker Plan calls for bold and often courageous economic reforms to be supported by the multilateral banks, the private sector and bilateral aid. For the major debtor countries, the plan calls for substantial increases in commercial bank lending, in loans from the World Bank and from bilateral donors. For the low income countries, mainly in sub-Saharan Africa, IDA funds, IMF reflows, and bilateral grant aid would be used for this creative effort.

But last year, the first year the plan was operative, our funding request for the multilateral banks was cut by a third. Similarly, bilateral funds were slashed to a level where we could only provide 30 percent of the resources necessary to support economic policy reforms in Africa. Clearly, it wasn't only foreign nationals who were hurt by these cuts. All those Americans whose livelihood depends on exports to the Third World were victimized as well. And I need scarcely remind you of the consequences to our domestic banking system -- and, indeed, the entire world financial system -- should major overseas debtors be thrown into default.

The cuts in our support for the World Bank and the other multilateral banks are especially damaging. Not only are these institutions at the forefront of our efforts to get the economies of our friends and trading partners in Africa and Latin America back on their feet; they are also just about the most cost-effective tools we have for leveraging resources for these countries. The U.S. puts up only a small fraction of the funds mobilized by the World Bank. For every dollar the U.S. contributes to the International Development Association, the World Bank's affiliate for aiding the poorest countries, other countries contribute three. Conversely, when the U.S. fails to follow through on its commitments, this reduces the World [illegible]s lending capacity far more than the actual cut in U.S. support.

To illustrate the devastating impact of budget cuts on our friends in the Third World, I would like to paraphrase the message I received last month from our Ambassador in the Dominican Republic. He reported that during a call on President Belaguer, he informed the President that the U.S. sugar quota had been cut almost in half, costing the Dominican Republic over $46 million in foreign exchange earnings. Our economic assistance to Santo Domingo had simultaneously been reduced by $30 million, and our military assistance slashed by over 50 percent. Our Ambassador concluded the conversation on an ironic note by wishing the President a Merry Christmas and a prosperous New Year. Incidentally, this is the same Dominican Republic that President Johnson considered so important to our interests in 1965 that he sent over 20,000 U.S. troops there.

Promoting Democratic Values

The U.S. also has a vital stake in promoting democratic values and institutions. This isn't starry-eyed idealism; it is realism. Democratic nations respect the rule of law both domestically and in foreign affairs; they grow more rapidly, and they are more stable internally, more capable of resisting subversion through their own efforts. Thus, in promoting democratic values and human rights, we are protecting our security and prosperity as well as advancing our most fundamental ideals.

One country where our successes in this area are especially noteworthy is the Philippines. There, President Aquino offers genuine hope for establishing a stable, democratic and prosperous country. U.S. military and economic assistance is essential to the fulfillment of these goals. For FY 1988, we are seeking $261 million for the Philippines as a tangible demonstration of our unequivocal commitment to the Aquino government -- and to the stability of the environment where two of our most important overseas bases are located.

In Central America and the Caribbean, as well, our continuing policy of support for pro-democratic forces is enabling democracy to take root and become self-sustaining. A few years ago, critics of U.S. policy toward Central America were skeptical that democracy could ever gain support in an environment where history and economic hardship seemed to conspire against it. They are less skeptical now. They have seen the people themselves, in one free vote after another, demonstrate their belief that democracy is the road to a better life for themselves and their children.

But the new democracies of Central America and the Caribbean desperately need our economic support. The President's Caribbean Basin Initiative and the recommendations of the National Bipartisan Commission on Central America provide a comprehensive national strategy for such support. Last year, the Congress sought to provide an additional $300 million in support of the Central American democracies. But since the Congress did not appropriate additional funds to fulfill that mandate in its entirety, we will have a cumulative shortfall from the recommendations of the Kissinger Commission of over $800 million through FY '87.

The Voice of America and Radio Free Europe/Radio Liberty also play an essential role in promoting democratic values and undermining the monopoly on information which is a key element in the Soviet and East European governments' mechanisms for maintaining their authority. The most striking example over the past several years of the power of such broadcasting occurred in connection with the nuclear accident at Chernobyl.

Western radio broadcasting spread news of the accident to the population of the USSR and Eastern Europe and compelled the Soviet government to address the concerns of its own people and its Warsaw Pact allies. The Soviet media became far more informative on Chernobyl following reports on the accident already circulating from Western broadcasts. Indeed, the Polish Government advised the country's citizens to listen to VOA for authoritative information on the accident.

Yet much of the equipment we use to get our message across is woefully outdated. In 1983, for example, President Reagan went to the Voice of America's Washington studios to deliver a radio address transmitted live to the USSR and other parts of the ~~world~~ in various languages. His appearance was only the second such visit to VOA by a U.S. president; the first was by Dwight Eisenhower, who broadcast a message to the world in February 1957. The Reagan message 26 years later was delivered from the same VOA facility that Eisenhower used -- with the same electronic equipment. VOA has undertaken a modernization program in recent years, but it still has a long way to go. The VOA has six superpower transmitters; the Soviet Union has 37. The VOA broadcasts in 42 languages; Radio Moscow in 80. We can easily win the battle of ideas, if we have the resources to do so. After all, we have the winning ideas and we simply must put up the resources to get them across.

Humanitarianism

Let me turn to another broad goal of American foreign policy -- our humanitarian efforts. The American people can be justifiably proud of their humanitarian instincts. Over the past few years the assistance we have provided has meant the difference between life and death for literally millions of Africans who faced the worst drought and famine the continent has experienced in this century. During the height of this crisis, the United States provided 2.2 million metric tons of food aid at a cost of over one billion dollars; another $150 million was spent to provide medicines, shelter, wells and the other immediate needs for those worst affected by the drought. This was all in addition to the regular economic assistance we provided during the same period.

Similarly, assistance to Colombia for its volcanic disaster, major earthquake relief efforts in San Salvador and Mexico City, and our support to combat locust infestations in 17 African countries are activities of which the U.S. government can be proud. Our support for the World Health Organization and UNICEF has helped rid the world of some of the most deadly and contagious diseases, and has dramatically reduced infant mortality.

Our assistance to the world refugee population is especially noteworthy. In the six fiscal years since the passage of the Refugee Act of 1980, the American people have offered new homes to more than half a million refugees -- a population greater than that for all other resettlement countries combined. And we have profited a great deal by doing so. Indeed, we know from experience that every generation of refugees has made enormous contributions to all sectors of our society. Just look at those who fled from Nazi Germany, from the Soviet Union and from Cuba. The benefits this nation has gained from the refugees who have sought sanctary here are incalculable.

Our position as the acknowledged leader in assisting the world's refugees -- the victims of oppression in their own homelands -- is further demonstrated by our generous financial support to multilateral and bilateral refugee relief programs. The strong, sustained interest of the Congressional committees which oversee these programs has enabled the U.S. to fund annually more than 25 percent of the international community's total contribution to the world's more than ten million refugees.

But it seems to me that what we all seek is the end of the conditions which create the need for many of these emergency programs in the first place. Obviously, we cannot eliminate natural disasters; but we do have the ability, the moral imperative and the national interest to confront the man-made causes of poverty and repression.

Our assistance programs do just that. It is political, economic, and social turmoil that cause vast numbers of people to flee their homelands. Conversely, the development of democracy and expanded economic opportunity can dramatically reduce the number of people compelled to abandon their native lands.

The War on Narcotics

Stemming the flow of narcotics into the U.S. is another major priority for all Americans, regardless of political affiliation. But this is a costly undertaking. You cannot just force farmers in most drug-producing countries to stop growing their best cash-crop without offering them economic alternatives. You cannot expect the governments of these nations to launch major programs without the economic resources to sustain them. And you can't expect drug-traffickers and narco-terrorists to give up their very lucrative business without putting up a fight -- and, in fact, they are working overtime to elude interdiction efforts and undermine democratic institutions by intimidation, corruption and violence. Thus, if we're serious about stemming the flow of drugs into our country, we must be prepared to use every resource at our command -- economic and military assistance as well as narcotics control funds.

This is what we are doing, for example, in Bolivia. Our military assistance is buying trucks and boats which the army and navy need to carry police forces to raid laboratory sites; our development assistance is being used to promote rural development and small industry, thereby helping farmers to stop growing coca for their livelihood; and our narcotics control money is being used to pay for police interdiction activities and public education.

The democratic government of Bolivia is embarked on a courageous battle, putting its very survival at stake, to shut down the second largest source of cocaine to the U.S. and Europe. Bolivia's leaders invited U.S. forces into their country last summer to assist in destroying cocaine laboratories in Bolivia, and in so doing drove the sales price of coca leaves below the cost of producing them. Now they want to follow up with legislation which will attack the problem systematically and comprehensively. However, this means depriving as many as 350,000 people, 1/6 of their population, of their current means of livelihood and helping these families with alternatives. Impoverished Bolivia cannot accomplish this herculean task, so important to us, without a substantial increase in our assistance.

The other Andean countries of Peru, Colombia, Ecuador and Venezuela are also engaged in a war against narcotics traffickers and the M-19 terrorists. These countries signed a treaty this past year - named in the memory of the Colombian Minister of Justice slain by narcotics traffickers - pledging regional cooperation against narcotics trafficking and production. And they are following up on their pledge with concrete actions:

--Colombia has eradicated 85 percent of the marijuana cultivated in traditional growing areas through an aerial herbicide program, using U.S. provided aircraft and communications equipment.

--In Peru, the Garcia Government is actively engaged in the eradication of coca and has aggressively destroyed laboratories and airstrips used by cocaine traffickers. Additional program support in FY 1987 is essential to reinforce Peru's initiatives in narcotics control.

These successes demonstrate how critical our resources are in winning the battle against narcotics. If we cannot provide this vital assistance to the Andean nations, we will not only be sending a signal that we are unreliable and indifferent to their problems; we will also set back our own campaign to create a drug-free America. Yet funds we planned to make available to the Andean countries were slashed by almost half because of budget cuts we sustained this year.

Finally, waging an effective war on drugs requires us to cooperate with friends and allies through the drug agencies of the United Nations. The UN narcotics agencies share our goals; they are working to gain control over the production and abuse of psychotropic substances. In addition, this year the UN will probably complete a convention on illicit trafficking which will support our own national policies. Here too, however, budgetary constraints may force us to reduce further our funding to UN agencies dealing with narcotics issues.

Combatting Terrorism

I need not belabor the threat of terrorism before this Committee. In 1985, the last full year for which we have detailed analysis, we counted nearly 800 international terrorist incidents. A third of those incidents caused casualties, with over 800 killed and 1200 wounded. These figures tend to understate the actual level of terrorist activity, since incidents confined to one country, with the nationals of only one country involved, are not included.

Knowing as you do the figures presented by the Inman Commission, you realize that protecting ourselves against terrorism does not come cheaply. Dear as protection is, however, we know that the money is necessary. Aggressive intelligence analysis, heightened security awareness and enhanced physical security helped to thwart 120 planned terrorist incidents last year. Although protection of sources and methods preclude my making public all these examples, I can cite a few:

--In Baghdad, there is little doubt that the nine-year-old daughter of our Deputy Chief of Mission escaped death or serious injury when the reinforced glass in the residence windows withstood the blast of an Iranian surface-to-surface missile which exploded nearby.

--Reinforced window structures probably saved lives when a 122 mm rocket struck the residence of our ambassador in Beirut.

--Vehicles as well as structures must be protected. In Central America a mission staffer's official vehicle was hit by six different bullets, none of which penetrated the armor.

But let me make it clear that our efforts to counter terrorism extend beyond looking after our own. We of course have a special responsibility to those we send abroad to conduct the nation's business, but most of the millions of Americans who live, work and travel abroad will not be saved by thicker armor and more guards. There is not enough brick, mortar and armor plate to protect all our citizens and interests. We cannot, must not, just sit and wait for terrorists to strike. We must continue to address the terrorist problem more assertively.

The use of force must always be present in our list of options. But there is more to an aggressive counter-terrorist policy than using force against terrorists. We must and do work with other nations to identify, track, apprehend, prosecute and punish terrorists. This requires that we:

-- closely cooperate with other nations on counter terrorism efforts;

--persuade those nations reluctant to cooperate in combatting international terrorism;

--provide training and other assistance to those with the will, but not the means;

Cooperation such as this has begun and is showing results. This progress is manifested in a series of joint declarations such as those at the Council of Europe in Strasbourg, the

Declaration at the Economic Summit in Tokyo, by the European Community, and by the NATO Parliamentary Assembly. The progress is more than rhetorical. Nations are increasingly adhering to the rule of law, instead of sometimes releasing captured terrorists. Terrorists have been convicted in London and Berlin and indicted in Ankara. Other trials are coming up in Rome, Madrid, Karachi, Vienna, Valletta and Paris. These declarations and prosecutions would not have been possible without increased international cooperation.

We and other countries are also strengthening the existing extradition teaties. For example, the Senate last year ratified the amended extradition treaty with the United Kingdom. We are also drafting amended treaties with other nations to make it more difficult for terrorists to avoid extradition on the pretense that they were committing "political acts" rather than criminal deeds.

Our efforts to promote international cooperation against terrorism in the Specialized Agencies of the UN are also beginning to bear fruit. The International Maritime Organization has adopted measures to assist countries in protecting ports, ships and passengers. It is currently working on a convention which will strengthen the ability of the international community to punish or extradite terrorists acting against ships and crews. Similar measures are in train or have been taken by the International Civil Aviation Organization. These are actions we have initiated or supported. Regretably, budget cuts have prevented us from meeting our relatively modest assessments to both the International Maritime Organization and the International Civil Aviation Organization.

These successes only represent the opening shots in the war against terrorism; more, much more needs to be done. Yet now, of all times, the United States is having trouble of its own in the battle against terrorism. Our hearts are in the right place; but where are our resources? We have been unable to obtain enough funding to strengthen our embassies and other overseas facilities as quickly as we should against terrorist attacks. We have difficulty in finding the money for anti-terrorism research and development on such projects as coming up with better ways of detecting explosives or chemical and biological agents at a time when the terrorists are becoming more innovative.

The information and insight necessary to fight terrorism dramatize the need for a professional and vigorous U.S. Foreign Service. To take account of developments abroad in the formation of policy, we need accurate and up-to-date reporting on political and economic conditions around the world. Bear in mind that over three-quarters of the reporting and analysis used by the U.S. Government comes from Foreign Service officers stationed around the world. These are the same officers who also work to gain support for our policies. Yet we will have to reduce sharply our overseas staff; we are being forced to shut down another seven consulates, in addition to the seven posts closed last year; and we have to cut back on our foreign language training at overseas posts by 50 percent.

Make no mistake about it. Our ability to understand and influence the international environment in support of the interests of the United States is dependent on a strong, career Foreign Service. Though a small part of the international affairs budget, a sound foreign affairs infrastructure is essential. In seeking to maintain it, we face direct budget cuts, massive exchange rate losses and differing rates of inflation. But we must find the necessary resources, since that will determine in large part whether or not we can successfully pursue a coherent, sound, and strong foreign policy.

We in the Administration and you in the Congress must make many difficult choices in these times of severe fiscal restraint. As we make those choices, many of which deal with the vigor of the national economy and the health of our society, we must not impair our ability to influence a world which will set the limits to our national possibilities.

Conclusion

Mr. Chairman, I hope my presentation today has helped to clarify just how the foreign affairs budget enables us to pursue our specific national interests. But as I pointed out at the outset of my testimony, over the past two years Congress has reduced the foreign affairs budget far too drastically. Unless we take action now to reverse current trends, many foreign policy gains we have made in recent years could be wiped out.

What, then, must be done to narrow the gap between our interests and our capacities to pursue them? Well, the obvious first step is to restore the funds that have been cut, and review the obstacles to using our funds as effectively as possible. But we must do something more. We must also relearn an old and very important lesson -- a lesson which was well-understood forty years ago, but is in danger of being forgotten today.

This fundamental lesson is that it takes resources -- modest but sustained, and applied credibly over time -- to advance the national interests of the United States. The expenditure of such resources is not a "giveaway"; rather, it is an essential investment in a better future for ourselves and our children.

How do U.S. resources advance American interests abroad? The Marshall Plan is a dramatic example. Designed to restore a war-ravaged Europe and prevent the spread of communism, the plan cost American tax-payers about $14 billion. When it was first proposed in 1947, critics of the plan argued that it was wrong to use taxpayers' money for Europe's internal needs. But their opposition was overcome -- and rightly so. For today it is clear that the Marshall Plan was not simply an act of giving on an unprecedented scale. It also saved Western Europe from Soviet domination -- and saved the United States from the disasterous consequences that a Soviet-dominated Europe would have had on our national security, our economic prosperity and our democratic values.

The success of the Marshall Plan forty years ago demonstrates that foreign affairs is not always a "zero-sum game." We do not necessarily advance our own vital interests at another nation's cost. On the contrary, more often than not, the most effective way of promoting our basic goals is by working with others to achieve their basic goals. That is what a Democratic President and a Republican Congress understood in 1947 when they allocated 11 cents out of every Federal dollar to fund the Marshall Plan. And that is what I hope you will all bear in mind as you consider the President's request to allocate only two cents out of every Federal dollar to support the whole foreign affairs budget.

Let me conclude by taking note of a happy coincidence. This year marks the Bicentennial of the Constitution and the fortieth anniversary of the Marshall Plan. Both of these milestones should lead us to pause and reflect on the nature and purposes of American government. The Bicentennial reminds us that it is possible to establish a government powerful enough to meet its global responsibilities, yet sufficiently constrained to be able to safeguard the rights of individual citizens. The Marshall Plan reminds us that when our government has a clear sense of purpose, it can change the course of world history for the better. It is is still within our power to change the course of world history for the better. The opportunities are there. We need only to grasp them.

Chairman CHILES. Senator Johnston.

Senator JOHNSTON. Thank you, Mr. Chairman.

Mr. Secretary, first, may I commend you for how you have conducted yourself and what you have said in this very difficult time for you, the so-called Iran-gate. I think you have shown yourself to be a man of skill and knowledge and prudence, qualities which are lacking in some quarters.

I must say I think you have balanced the need for loyalty on the one side and candor and truth on the other side. I do not ask for a reply to that. I just say that I really do think you are needed in this administration and I am glad you have decided to stay.

LACK OF REVENUE REQUESTS IMPERILS BUDGET

Secondly, on the question of your budget, I find the basic need of foreign aid to be very great indeed. I think the budget overall is prudent, but, of course, you are very correct in that the main issue is not whether this budget is prudent, but whether, considering the administration's inability to seek any revenues, to really do anything about the deficit, places this budget very much at risk.

For example, you use the example of the Dominican Republic, and the question is, to me, if I had balanced the sugar quota for the Dominican Republic against ever-increasing unemployment in the sugar industry in Louisiana, which is really in a great depression right now—the whole State is—the choice is a very easy one for me.

I wish the administration would make the choice easier so that there would be some money to do something with this foreign aid budget as opposed to cannibalizing domestic programs which help Americans.

As I think you know, most Senators are help-America, or at least help-Louisiana first, before we spend money on foreign aid.

HAS FIGHT AGAINST TERRORISM BEEN HURT

Next, Mr.

Secretary, I notice on page 27 of your statement with respect to terrorism that you say we must work with other nations to identify, track, apprehend, prosecute and punish terrorists, and that this requires, among other things, that we "persuade those nations reluctant to cooperate in combatting international terrorism."

My question is, how much have our efforts in combatting international terrorism been hurt by our hostage deal with Iran and, more specifically, with respect to Germany, do you expect that the fact that they took the two German hostages and apparently are asking that they be traded for this prisoner they have taken which we want extradited—do you expect that to interfere with the extradition?

Secretary SHULTZ. Well, first of all, on our basic policies on terrorism, I think they are strong and respected. The basic reason why that is so is that they are right; that is, other countries are not taking attitudes toward terrorism because they want to please us.

We discuss it and talk about and they take those attitudes because they see those are the right policies for them. It was very clear to the British, for example, when they caught the man who put explosive in his girlfriend's suitcase as she prepared to board an El Al plane, that they should prosecute. That is in their interests, it is in our interests, it is in everybody's interests, except the terrorists, and so on. There are a lot of cases around.

So I think that the strength of our policy is that it is a good policy.

Senator JOHNSTON. But has it——

Secretary SHULTZ. Now, the problem of making trades for hostages—of course, the President has said on many occasions that it was not his idea that what we were doing was trading arms for hostages.

Rather, he has said publicly that he intended that to be a signal having to do with an effort of a much broader nature involving Iran. However that may be and however it may wind up appearing, I think the arguments for why it is not a good idea to make trades for hostages have been highlighted and perhaps are more vivid in people's minds now than they have ever been.

To a certain extent, and perhaps it is hard to say it, but we all have tremendous sympathy with anyone who is taken hostage and with the families involved. But perhaps we realize that we cannot break our basic principles as a result of that, and I think that has become clear.

Now, with recpect to the case of the man apprehended in Germany that a grand jury has indicted for his involvement in the TWA hijacking and the murder of Robert Stedham is concern, our papers have been submitted; they are in order. The process is underway.

It takes quite a bit of time, apparently, under the best of circumstances. We believe that it is being acted on perhaps with greater expedition, but that process is underway and I have no reason to believe anything else.

And I might say this is in the face of all sorts of threats that the terrorists are making and actions that they take that we have to be prepared for and we have to alert our people around the world.

But this war on terrorism——

Chairman CHILES. You did not think there was some shift in the signals between the time they took one German hostage and when they took the second one? You know, we only read the papers, but it sounded like they slowed down.

Secretary SHULTZ. Well, I do not know how many of you are lawyers.

I am not, but I am told by the lawyers——

Senator EXON. I am not.

Secretary SHULTZ. I am glad to see you here, pal. [Laughter.]

I am told that extradition requests typically take quite a while, and we expect that this will be acted upon in less time than usual. And insofar as any communications that we have received, we have not seen any shift.

I think it just illustrates the hardness of this problem and the importance of standing up to it.

Senator JOHNSTON. Thank you, Mr. Secretary.

NEW ABM TREATY INTERPRETATION

Mr. Secretary, for years there was an interpretation of the ABM treaty that said with respect to tests in space of new technologies such as beam weapons that they would, in fact, constitute testing or deployment, in violation of the ABM treaty.

A new interpretation came about by some former assistant U.S. attorney who was commissioned by people over, I think, in the Defense Department to give a new interpretation, a former anti-pornography lawyer—we call it the pornography interpretation in my office. He came up with a view that it would not violate the ABM treaty to have testing and, in fact, deployment, as I understand it, of beam weapons.

I understand that you have counseled that we stick to the original interpretation of the ABM treaty, and my question is, was that your advice, does it continue to be your advice, and why is it important for us to continue to stick with the ABM treaty, if that is your view?

RESEARCH WITHIN TREATY LIMITS

Secretary SHULTZ. The President's stated policy is that the research we are conducting is being conducted within the framework of activities permitted under the ABM treaty, and he has set out that this is being done within what is called the narrow definition. That is the President's policy. It has been made public and it is explicit, and I support that.

With one exception, I never divulge the advice I give to the President. I think that is privileged information, so I am not going to tell you what my advice is. The one exception is on this Iran matter when the President instructed me to tell the various committees and investigative authorities what I have known about it and what positions I have taken, and so forth, and I have done so. But that is the only exception, and that is on the instruction of the President.

ABM TREATY AND NEGOTIATIONS STUDIED

Now, within my own Department, we asked a man, who is an outstanding attorney—I was very fortunate in persuading him to be the legal advisor to the State Department. He is a judge, I might say, appointed in the Carter administration, in New York—an outstanding man, Judge Abe Sofaer.

What we asked him to do was, consulting within the Department—that is, with Paul Nitze, who has been around—basically to read the record of all the negotiations and the treaty, and so on, and tell us what his conclusions were.

Now, this is a man who is a genuine scholar. He was a clerk on the Supreme Court and an eminent judge; he has written leading works on the early days of our Constitution and has a formidable intellect. He may be the only person alive who has actually personally read the whole record.

So he reached a conclusion based on that. That is not the same thing as researching the record of what was the testimony before the Senate and what the Senate acted on and all that. That is a different issue.

Senator JOHNSTON. I understand.

STUDY CONCLUSIONS

Secretary SHULTZ. What Judge Sofaer did was reflect on the negotiating record and, basically, a quick, thumb-nail summary, I think, of that is that in those negotiations the U.S. view basically was that we wanted to base deterrence on offense and we wanted to restrict defense.

We sought to get as narrow a prescription of what permitted activities could be as possible. The Soviets, having been invaded a few times, perhaps understandably have a much greater orientation than we had to defense, and we see that in fact, they have deployed the only deployed ABM system around Moscow, and their air defenses are very extensive and their command and control provisions, and so on, are impressive and much greater than ours.

They did not want to be restricted on defense and, in particular, on questions having to do with so-called new physical principles. They took the position, that you cannot place restrictions on something you do not know about.

So Judge Sofaer concluded that from the negotiating record a broad interpretation, or what has become called the broad interpretation, is fully justified. However, the President's position, as he has set it out, is that the SDI program is being conducted now within the narrower definition.

Senator JOHNSTON. But is it American policy——

Secretary SHULTZ. So I am really reflecting not on the lawyer that you have described, although I do not cast any aspersions on him, but——

WHAT INTERPRETATION IS POLICY

Senator JOHNSTON. But the key question, if I may interrupt, Mr. Secretary, is: Is it American policy that the narrow interpretation is our policy? I am not speaking about whether what has been done is consistent with a narrow or broad policy.

Is it our policy to adhere to the narrow interpretation or to the broad interpretation?

Secretary SHULTZ. The President has stated in writing that the SDI program is currently being conducted within the framework of the so-called narrow definition of the treaty. He has also made it plain, as have others, including me, that from the research that we have done, and I described it to you, that we think a broad interpretation is fully warranted by the record.

Senator JOHNSTON. So it is our position that we may go to the broad interpretation at any time. In other words, we may change our focus on SDI and go to the broad interpretation, consistent with the treaty?

Secretary SHULTZ. I have described the President's position and described the process of analyzing the treaty, and what decisions the President may make I am not here to try to forecast. I am describing the situation as it is.

Chairman CHILES. Senator Grassley.

DOMESTIC SUGAR PRICES HIGH

Secretary SHULTZ. I probably should not pick a fight with the Senator, but I have to make a comment about the sugar point, and I know we will not agree on this. But I really think it does not serve the sugar interests to price sugar out of the market.

Our quota system has resulted in a price of sugar in the United States, I think, around five times what it is on the world market.

Chairman CHILES. Mr. Secretary, only 20 percent of sugar moves on the world market price. Our problem is you are talking to a lot of sugar people up here and I do not know that you are going to get any sort of agreement.

But you have to realize that the problems with sugar came is that other countries, especially the commonwealth countries, subsidize so greatly. They are the ones who started the subsidization of sugar.

We were operating basically without a sugar bill for a good while. We were letting the world price go, and the tremendous increase in prices followed. Now, the world price of sugar is a nickel a pound. Nobody produces sugar at that price; nobody does.

That is subsidized sugar countries have it dumped on the world market, and 20 percent of the sugar passes on that. The rest of it is subsidized by these other countries. That is what drives up the price of sugar so much.

Secretary SHULTZ. I have the feeling I should not have brought it up.

Chairman CHILES. Yes, sir. [Laughter.]

Secretary SHULTZ. But what is happening, Mr. Chairman, is that——

Chairman CHILES.Do not try to sugar an old sugarer. [Laughter.]

Secretary SHULTZ. OK. [Laughter.]

Chairman CHILES. Senator Grassley.

Senator GRASSLEY. Mr. Secretary, even though I may have some questions that you consider very difficult, I do not want them to detract from the warm feeling I have about the work you are doing as Secretary of State, nor the feeling of ease I had when you said you were not going to resign when there was indication in the press you were considering it, or a feeling I have that the President is going to need you for the full 2 years of the rest of his term and not just through the immediate crisis we presently have, and also a feeling that the rock of Gibraltar vision you give to our foreign policy with our allies is very important.

Secretary SHULTZ. I feel like I am being set up. [Laughter.]

IS LEGISLATION NEEDED TO AID INTELLIGENCE SERVICES

Senator GRASSLEY. Well, you mentioned in your testimony that we are winning a war of ideas in the world. I would like to explore with you a war that we are not winning, and that is the war against terrorism, and particularly in the Middle East.

Mr. Secretary, given what we know publicly about the serious problems that we have had in Lebanon and the problems that got some attention here a month ago about back-channeling, does the administration intend to formulate new policy or, if necessary, ask for legislation to define the propriety role of the U.S. intelligence services in actual fieldwork against terrorists in the region of the Middle East?

Secretary SHULTZ. I do not think there is any need to redefine it. What we need is more, and we need——

Senator GRASSLEY. Well, I put it in the light of the problems of back-channeling as one example of the problems we have had there.

Secretary SHULTZ. Well, that is a question of making clear reporting arrangements, and I have tried to make sure that all our ambassadors have a clear view of what the chain of command is.

That chain of command is they work for the President and they get their instructions from him through me and the assistant secretary, and they are told no one changes that except the President.

So if they hear from the President that they are to ignore me, well, then they can ignore me.

But if they hear from somebody else in the White House, they should blow the whistle to me.

Senator GRASSLEY. You are saying that no further definition of the role of the intelligence community is needed, then?

Secretary SHULTZ. I do not think that when it comes to this question of terrorism that there is anything, in particular, other than what we have been doing, of course, which is—placing a lot of emphasis on improving our intelligence capability and our capability of working with the intelligence agencies of other countries, and it has been paying off.

We have had lots of people come here for training.

We have developed good contacts around the world and when something happens, we are able to work together.

And it is for that reason that there have been identified these 120 terrorist acts that did not happen.

It is through improving our intelligence.

It needs to be improved more, and this is a field where our various electronic and other means of gathering intelligence, of course, are very important, but human intelligence is especially important and it is extremely difficult for us.

INTELLIGENCE GATHERING WEAKNESS

Senator GRASSLEY. Do we have a weakness in the Middle East in terms of intelligence gathering?

Secretary SHULTZ. We have our problems. I think it has improved quite a bit in the last few years, but we have our problems. One of them is, as is our great difficulty, in keeping things a secret.

And I think we probably are in for—and I would welcome a good, full debate on the question of openness and secrecy and when it is appropriate, and so on. I think it is quite a profound question.

But when you are talking about human intelligence abroad, if people abroad feel that when they work with you, it is liable to become public, they will not work with you, and we have to have people who will work with us. So there is a problem there, but that is not anything you can cure by legislation.

MILITARY OPTIONS AGAINST TERRORISM

Senator GRASSLEY. On a follow-up on terrorism, then, considering the hard line that this administration has and that you have stated very well for them against terrorism, and particularly given the administration's often-stated views supporting military actions, if necessary, do you, Mr. Secretary, now think it is time for the United States to prepare military options against terrorists, and especially those groups holding American hostages?

Secretary SHULTZ. The President has made it clear that while we are not looking around for opportunities to use military force that the terrorists of this world should realize that we do not rule it out.

So they have to calculate that there can be a cost to them of their activities, and a state that sponsors terrorism has to realize that there can be a cost to them. Now, Libya has found that out, and I think it was a very salutary thing and it has had a major impact.

REFORMULATE POLICY TOWARD LEBANON

Senator GRASSLEY. It seems to me that everybody in the world knows that Lebanon, becoming the haven for terrorists that it has—that situation probably traces back to our ending of U.S. policy there.

Given your past efforts to bring peace to Lebanon, and particularly our ill-fated May 17 agreement between Lebanon and Israel, do you think it is now time to reestablish or reformulate a U.S. policy to Lebanon to restore some semblance of stability there, which we would hope then would eliminate the infrastructure of terrorism there?

Secretary SHULTZ. Well, there is nothing wrong with our policy toward Lebanon, but it is a fact that there are very distinct limits to our ability to bring about change in Lebanon, and the problems of Lebanon and the fractiousness of Lebanon go back a long ways, although there was a period when it was a garden spot. I have been there and know Beirut in its wonderful days.

But there is a tremendous amount of internal feuding among various groups in Lebanon and, of course, you have now the major Palestinian PLO influences there that have returned and you have the Iranian influences, exercised through the so-called Hizbollah and various groups that are more or less related to that.

So Lebanon presents a rather chaotic picture and it has become a place that is almost a haven for terrorists. It is a problem.

NEGOTIATIONS WITH TERRORISTS

Senator GRASSLEY. I would like to have you tell us just a little bit about—since there is, you know, the contradiction that we have between your well-known position on the matter of not negotiating with terrorists and then the United States position which is the same way, how can the United States over the next few weeks be able to establish our moral leadership, which I think has been lost somewhat, and particularly our political integrity with its allies, and particularly small, neutral nations that need our protection and who need our uncompromising advice, when we have this inconsistency in practice versus what our policy is?

Secretary SHULTZ. Well, our behavior, our statements are what will count. Right now, for example, with respect to the extradition request, it is not only the Germans that have been threatened, but we have been threatened and we are not flinching.

Senator GRASSLEY. But has not our actions being different than our word created serious problems for you? I mean, it seems to me like your recent trip to Europe is an example of that.

Secretary SHULTZ. I did not have any problems in my recent trip to Europe. Quite to the contrary, the countries around the world are not, contrary to what you sort of read, looking for opportunities to regale the United States. Their attitudes are quite to the contrary.

They see very clearly that a strong and confident United States is important in the world and they are rooting for us.

Senator GRASSLEY. Well, then, this is more of an American problem than it is a world problem for America?

Secretary SHULTZ. Terrorism is a worldwide problem. It occurs mostly in other countries. Fortunately, we have not had terrorism in this country, particularly, but it happens to Americans while they are abroad, so it is a problem we address.

Senator GRASSLEY. That was not my comment. I mean, our comment of inconsistency between our actions and what we say and your response in regard to Europe—and you did not have problems there—you are really saying that the Iran investigation and the problems that are coming out of that are more of an American problem in America than it is a problem for America in the world.

Secretary SHULTZ. People watch it, obviously, but I think, as I said earlier, that if this incident has reinforced anything, it has reinforced the correctness of a policy that says let us not make trades for hostages and give in to terrorists.

Now, as the President has said publicly, as he perceives what took place and what he authorized—just quoting him, that what he authorized was a sale of arms as a token in an effort to find a rearranged arrangement with Iran.

Chairman CHILES. Senator Sanford.

SHARE MILITARY BUDGET TO MEET STATE BUDGET

Senator SANFORD. Thank you Mr. Chairman. The 2 cents that the State Department gets appears to me to be very well spent in our quest for security and peace around the world. Our problem, of course, is that the President threatens to veto any revenue enhancement or taxes to provide more foreign assistance; that is not permitted.

So, sitting here on this Budget Committee, we have hard choices to make. It just occurs to me, however, that you spend that money so well and the aid program is so well done, what would you think about taking a half cent from the military budget and giving it to the State Department?

Secretary SHULTZ. Well, while I do not presume to be an expert on all the ins and outs of military spending, I do observe the results and see their impact on our foreign policy, and I think that the bringing back of the strength of our military capabilities through the defense build-up has been one of the most salutary influences we have had.

Everything that I see and read suggests that the defense budget is a very tight budget, and to the extent that we see the reductions that have taken place, they have probably taken place disproportionately already out of the defense budget.

The President's request that I am representing here was presented in the framework of an overall budget that he presented to you that met the budget targets. I recognize you do not agree with all of the composition of that, but that was his——

U.S. POLICY IN CENTRAL AMERICA

Senator **SANFORD**. Well, I did not expect you to make a grab for the military money. And, of course, the budget does not meet the Gramm-Rudman requirements, by all of the reports that we have, but that is something we have to struggle with, as you know so well.

I would like to point your attention to page 11 of your testimony that says, "U.S. policy in the Central American area seeks to counter the challenge by promoting security, democracy, economic development, and social reform. We are asking for $1.4 billion to cover these costs."

I would like you to talk a little bit about that item and how you expect that will be deployed and what results can be anticipated.

Secretary **SHULTZ**. Thank you. I appreciate that question. If you contrast Central America today with a few years ago, I think what you see is a sharply improved situation.

You see Costa Rica that has been a free and democratic country for a long time, is still so. You see that it is now joined in that category, with whatever degree of fragility and newness, by civilian elected governments, presidents, in Honduras, in El Salvador, and in Guatemala.

As early as when I became Secretary of State and appeared before congressional hearings, most of our arguments were about El Salvador, and many people were inclined to give up on El Salvador as it was being assaulted from Nicaragua. That has been turned around.

You were not allowed to pronounce the word "Guatemala." So there has been a big change, and what we seek with that money that goes basically to those countries is to help them preserve and enhance the democratic structure that has emerged and to develop themselves economically—they are poor countries, although not necessarily inherently so—and to so develop themselves in a somewhat different pattern than the past so that the prosperity will be more widely shared. You will not have the hierarchical form of economic development that prevailed there in the past.

Beyond our support for economic development is support in the form of security assistance, and there is not any question about the fact that if you are in a country where there are forces ranged against you trying to upset your country, as in El Salvador and the others, but take El Salvador, you have to have an armed force that can get out and do something about it.

And, again, as you take today as compared with 3 or 4 years ago, the ability of the Salvador armed forces to deal with the communist guerrillas is very, very much improved, not only improved in their effectiveness directly, but their orientation, their sense of their relationship to the civilian populations involved, and so on. All of that has moved to the better.

KISSINGER COMMISSION RECOMMENDATIONS

Now, all of these situations have their elements of fragility in them, but there is definite progress and that is what that money is supposed to support. We, as you know, had a bipartisan commission, a genuinely bipartisan commission, that reviewed the Central American situation under the chairmanship of Henry Kissinger, with leading Democrats and leading Republicans both on this commission.

They made strong recommendations, and I am sorry to say that our appropriations in support of those recommendations have fallen short. This was all instigated by Senator Jackson.

Senator **SANFORD**. I ask you to focus on that. Are you asking for enough money to carry out the policies suggested by the Kissinger Commission?

Secretary **SHULTZ**. Well, we do not quite come up to it and that is why, in the supplemental that we asked for, we have some money that is designed to bring us back up, as well as to meet the El Salvador earthquake. That was a devastating earthquake in a country that is not a——

Senator **SANFORD**. Which, of course, was not in the Kissinger plan.

Secretary **SHULTZ**. Thank you.

Senator **SANFORD**. Oddly enough, he did not see it. You would have expected him to.

BREAKDOWN OF FUNDS FOR CENTRAL AMERICA

Talk a little more about where the $1.4 billion goes, if you do not mind. How will that be allocated?

Secretary **SHULTZ**. The country breakouts are—I will first read the totals, then I will read the division between economic and security; Costa Rica, $120 million, of which $118 million is economic support and $2 million is military. That is not really military in Costa Rica; it is more police.

El Salvador is $441 million, and that is $319 million economic and $122 million military, security assistance. They have the greatest problem. Guatemala, $145 million, of which $139 million is economic; $6 million, military.

Honduras, $238 million, of which $157 million is economic; $82 million, security. Panama, $33 million, of which $29 million is economic and $4 million, military. And then we have a sense of some regional economic programs that are not specific to any one country but have to do with the region and, of course, there is nothing military there. That is $61 million in regional programs.

Senator **SANFORD**. Well, thank you very much. I think my time is gone. I would like to, if we get a chance, know a little more about the regional programs, but maybe I can come back to that.

Chairman CHILES. Thank you. Senator Conrad.

Secretary SHULTZ. Just one other thing.

Chairman CHILES. Yes.

Secretary SHULTZ. The total that I read off comes to a $1,039,000,000, and then you add on to that $300 million that we have asked for in the supplemental that moves us toward the Kissinger Commission recommendations.

Chairman CHILES. Senator Conrad.

PEOPLE WOULD BE UPSET AT PRIORITY LIST

Senator CONRAD. Welcome, Mr. Secretary. I am one who holds you in great respect. I think you are a man of character and have good judgment and are a distinct asset to this country in conducting its foreign policy.

From your perspective, operating in your area of responsibility, I think the picture that you paint is entirely accurate, but there are other perspectives. I was struck by your suggestion that we call Tokyo because this Senator is more likely to call Tolna, North Dakota.

You talked about Frankfurt; I am more likely to deal with the folks in Fryburg or Fairmount. We have troubles, too. In my State, the economy is devastated. We are in the midst of a very deep recession. Very, very deep cuts are being made in spending in my State and people are hurting.

If the people of my State were sitting here and heard your request and went through the priorities, they would frankly be upset. They would be upset to see a 25-percent increase, if the supplemental is included. They would be very upset to see that the fastest growing part of the budget in the last 6 years has been for military assistance, they would be deeply disturbed that the biggest area of cuts is food assistance. Again, the food programs are slated for another 10-percent cut in your budget.

The people of my State, I think, if they were here, would ask why are these the priorities? We have the biggest increase in the last 6 years in military assistance. Why the biggest cut in the area of food assistance? What would your answer be to those people?

ASSISTANCE BUDGET IN INTEREST OF NATION

Secretary SHULTZ. Well, first of all, these resources that are being asked for, as I tried to bring out in my description of them and testimony about them, are undertaken in the interests of the United States, in the interests of people in all the States of our Union.

It is not a question of saying, well, let us let go of some resources we might use here so that they can be used over there. It is important to our interests that we know what is going on in Germany or Japan.

Frankfurt is one of the world's great commercial-industrial cities, and I have it on my mind because we are struggling so hard, given the currency rates, and so on, to keep ourselves in business there as a country. It is in our interest to be there.

I mentioned Tokyo because we have had this big change in the yen-dollar rate, and I know, with members of the Senate, Mike

Mansfield has a certain amount of credibility, so he understands your problem.

I might tell a little story about Mike Mansfield that illustrates this point. There used to be in my office—I do not have it there anymore—one of these big globes that lights up inside, and when ambassadors would come in to see me, our ambassadors, before they went off to their post or on a visit or something, I would say to them in jest, well, before you are allowed to go off to your post, you have to spin this globe around and point out to me your country. So they all would spin the globe around to whatever country they were going to and point it out, and I would say, fine, off you go.

Mike Mansfield came in one day, so I said the same thing to Mike, and Mike did something no other ambassador did. He spun the globe around and the United States came up and he put his hand on the United States and he said, that is my country.

That is the way we have to look at it. The United States—that is my country, too. These things I am asking for, I deeply believe, are in the interests of the United States.

I am not the special pleader for this, that or the other country. They are not my country. I like those countries, but they are not my country. My country is right here with your constituents.

PRESIDENT'S BUDGET NOT OBJECTIVE

Senator CONRAD. Let me follow up on that, then, because I believe that you deeply believe in what you have presented here. At the same time, we are coming from a little different perspective.

We may fully respect what you have proposed here. Our problem is we have been presented with a budget from your administration that frankly does not add up. It does not meet the $108 billion deficit target by any objective test, and so we are put in a posture of either neglecting our duty to this country to reduce the Federal deficit—which I believe and the people of my State believe has to be reduced. Or we are in a position of buying a budget like this one, or else deciding to make further cuts. That would take a big whack out of your budget because, frankly, out across the countryside there is a lot less support for this aspect of the budget than almost any other.

So I would be saying to you, can you not go back to your administration and come up with a budget proposal that is more realistic than the one that we have in front of us? If you really believe that your area of the budget cannot be deeply cut, then it is incumbent on you to argue within this administration to come back here with a budget that adds up.

Secretary SHULTZ. Well, I am not the budget director. I used to have that job. He can have it; I do not want it. [Laughter.]

But I, of course, follow the overall budget questions, and having been Secretary of the Treasury once on the revenue side—and that is other people's turf, so I stay off of it.

But the President has made a very strong and conscientious effort to present a budget consistent with the Gramm-Rudman-Hollings targets and has fitted our foreign affairs budget within it.

Senator CONRAD. Mr. Shultz, our problem is he has not done it.

Secretary Shultz. Well, that is your opinion. He thinks he has.

Senator Conrad. Well, by any objective standard, he has not, and that is the difficulty that we are in. I mean, if we are going to be honest with ourselves and honest with the country, this budget does not add up.

So you are going to be victimized just as others are because we have got an obligation to get it to add up.

Secretary Shultz. Well, it adds up. You have perhaps different priorities. That is what budgeting is about, what priorities you have.

BUDGET TARGET NOT MET CBO SAYS

Senator Conrad. No; I am not talking about priorities. I am talking about meeting the Gramm-Rudman target. By CBO's estimates, which are objective, this does not come close to meeting the $108 billion. It does not come close.

Secretary Shultz. Well, the differences of opinion, as I understand them, between the CBO and the OMB's estimates have to do with what your estimate of economic growth is going to be, and that sets a baseline, and so forth.

Senator Conrad. That is one element. There are others as well.

Secretary Shultz. Well, it is a very important element, as I understand it. What accuracy there is to economic forecasts—there is always a question. They can be wrong.

There is the so-called blue-chip average that is somewhere in between the OMB's and the CBO's. If you look at the administration forecasts over the past 4 or 5 years, some have been too low and some have been too high.

Far be it from me to give an estimate of what the economy is going to look like 1 year or 2 years from now, but basically I am rather optimistic about it. I think the tax bill that you all put together last year is going to be a great boon to this economy, not only in growth, but it is going to strengthen its internal structure and make it better.

So I think things are looking pretty good, but there are differences and they result in different budget figures. But that is not not adding up; that is making an assumption that is explicit.

Chairman Chiles. Senator Exon.

Senator Exon. Mr. Chairman, thank you very much.

Mr. Secretary, let me just echo the words of several of my colleagues with regard to the high respect that we hold you in. I think you have been doing an outstanding job. I will not belabor that point anymore, but——

Secretary Shultz. Go ahead and belabor it. [Laughter.]

Senator Exon. Can I do it on his time instead of mine, Mr. Chairman? [Laughter.]

Chairman Chiles. His time is your time.

Senator Exon. I would just say, though, in all seriousness, that as much as I respect you, I would hope that the message has been sent very loud and very clear to the President of the United States that if he ever does to you and your Department again what he did in the latest fiasco, then I would be keenly disappointed, Mr. Secretary, if you did not resign. I hope that message has been sent to the President.

WORLD AWASH WITH GRAIN AND GOODS

Let me talk a little bit about the food matter that my friend from North Dakota just brought up. I think basically the reason that you might justify in your budget, as disappointing as that is to us in food-growing States, is the fact that there is more self-sufficiency in many of these nations for food than there was before, which leads to the point of the fallacy of this Administration's policy of selling our way out of the agricultural depression that my colleague from North Dakota cited, and it is very true.

That brings into focus the folly of this administration's program of selling our way out of the agricultural depression that we have now. There is no way we are going to do it because basically, while there are still some countries in this world where people are going hungry, the basic facts of the matter are that the whole economy of the world is awash in grain and is awash in good. That gets back to our difficulty with the ag problems.

I also want to compliment you, Mr. Secretary. You are the only witness to come before this committee representing the administration that has not started out in the very beginning with the proposition that we are here and we have met the Gramm-Rudman targets.

So I compliment you for not compounding that error, in my opinion, that has been participated in by every administration witness that we have.

Let me go to some very fundamental matters that I would like to ask you about and get your opinion on; first, a pretty overriding question as we look to the future of our overall foreign policy and how we are going to finance it and how we are going to fit it into this budget.

ICELANDIC SUMMIT

Last evening, former Secretary of State Henry Kissinger appeared on ABC's "Nightline" show. I do not know whether you saw it or not, but in that interview Mr. Kissinger indicated that the Iceland summit did more to damage the administration's foreign policy than even the Iran controversy and the Contra affair.

The former Secretary suggested that the President was not being adequately prepared to meet with the Soviets. From today's vantage point, what is your analysis of the Iceland summit? What would you do differently now or prior to the next meeting that we hope we will have with the Soviets in this particular area?

What went wrong with that meeting, and do you share the former Secretary of State's opinion with regard to the President not being sufficiently informed and prepared for that meeting?

Secretary **Shultz**. I did not see the program that you referred to, and Secretary Kissinger has a great deal to say on many programs and I despair of keeping up with them. [Laughter.]

So I will not comment, but I will just address myself to the Reykjavik meeting. I believe that it was an outstanding triumph for the President and it went well.

SUMMIT A SUCCESS FOR AMERICA

The reason why I think it was a triumph is that for the first time ever in a negotiation with a Soviet leader, we got up and out on the table the kind of numbers both in the intermediate-range missile area and in the strategic nuclear arms that represent very big reductions.

That is what the President has been driving at from the beginning, big reductions, and those numbers got up and out on the table at that meeting really for the first time. I think we have to go back and recall that when the President put forward his INF proposals in whenever it was, 1981 or so, the zero-zero option, and when he put forward the original START proposals in the spring of 1982 for major reductions, in both cases his proposals were greeted with skepticism and some derision, and people who were interested in arms control said that it showed he was not interested in arms control to make such a ridiculous proposal. They said, well, it would be great if it happened, but it is ridiculous.

But what happened at Reykjavik was that in INF there came in the big numbers something very close to the President's original proposal, and in strategic arms genuine 50-percent reductions, including addressing the internal structure and some very difficult counting rules having, for example, to do with bombers and how you handle that. So that was a big achievement.

Now, we are a long ways from having that nailed down, but the first step is to get these basic concepts up and identified numerically so that you can then try to consolidate that ground.

Now, where the President made some progress but basically we were not able to pull things together in anywhere near the same way, had to do with the space defense area, because there, fundamentally, the Soviets wanted the President to agree to something that would have basically scuttled our ability to do the research necessary to find out how to defend ourselves against ballistic missiles, and the President, I think very justifiably, would not do it.

PREPARATION FOR SUMMIT

Now, in terms of preparations, we had been preparing for years and we went there with our eyes open, and when the Soviets started putting out onto the table things that we had been arguing for for a long time, we were ready.

We had a very strong team of people at Reykjavik supporting the President so that when, at the end of the first day, we had identified more or less these possibilities, we set two teams to work, one in the field of arms control chaired by Ambassador Nitze, and the other addressing bilateral human rights and regional considerations chaired by Ambassador Roz Ridgway.

Both of those groups worked in the night and came up with very good results. So the fact that we did not come back with the Holy Grail is not a measure of failure. The fact that we came home from Reykjavik with some genuine and important new prospects, I think, should have been welcome.

In other respects having to do with ballistic missiles, I think at least it has shaken people's thinking up in probably a healthy way. So I do not feel that I have to explain a failure. I think, quite the contrary, that these results of genuine reductions are potentially good.

Chairman CHILES. Senator Simon.

Senator EXON. Mr. Chairman, let me just say that I have several follow-up questions. I realize now I made a mistake. I should ask my short questions first and then ask my long questions so that the witness can fill us all in.

But thank you for your explanation. I will have some followup questions.

Chairman CHILES. We will accept that confession and call on Senator Simon.

Senator SIMON. Thank you, Mr. Chairman.

Mr. Secretary, this seems to be praise George Shultz morning and I simply want to join——

Chairman CHILES. The Secretary, for not being a lawyer, I could almost confer a degree upon him. He has many of the attributes and talents of a lawyer.

Senator Simon.

Senator SIMON. Mr. Secretary, first, just a very small item in your budget but I think an important one and one I hope you will personally address, and I would like to talk at some point with you and some other key people in the Department about this.

FOREIGN SERVICE LINGUISTIC SKILLS

You have an internal report by Ambassador Monte Stearns that basically says the language skills of the Foreign Service are bad and getting worse. You have, second, a report from your inspector general that grew out of an amendment I put on the Foreign Service Act some years ago which was resisted by the State Department, in which I called for a demonstration project where in two embassies, everyone in the embassy, including Marine guards, secretaries, AID people, everyone, had to speak the language of the country.

Secretary Haig designated Senegal and Uruguay as the two countries, and the inspector general's report is now back saying it has been an amazing success both in improving the effectiveness of the two embassies and in raising morale in the two embassies.

The question is what do we do with these two reports. Do they just gather dust or do we follow through? I do not expect an answer here, now. In terms of your budget it is a small item, but I think it is a very important one.

Secretary SHULTZ. Well, let me give you an attitudinal answer, and with some precision.

Senator SIMON. Yes.

Secretary SHULTZ. I wholeheartedly support the idea of people speaking the language of the country they are in, and the more of the people who are there that can do it, the better.

Some languages are known by a relatively large number. Others are not only not known, but sometimes extremely difficult. So a person has to invest a great deal of time in order to acquire a functioning capability with that language.

For that reason, the Foreign Service Institute puts a lot of emphasis on language training, and it is my understanding that it is the outstanding language training place in the United States and it certainly is one of the best anywhere.

I also think that trying to spread linguistic abilities throughout everybody at a post is highly desirable, and for that reason we have a program of at-post language training. You do not get training before you go, but while you are there; if you have some, to improve it, and if you do not, to get you so you can move around in the society.

LANGUAGE TRAINING INCREASES BUDGET

I am sorry to say to you that one of the casualties in these, I think, deep cuts is our ability to fund these kinds of programs. We put it back in the 1988 budget. It is one of the so-called increases and I think it is merited.

Senator SIMON. Well, I would simply comment that I want to encourage that part of your increase. I think it is extremely important. I agree with what you have to say. I think we have to recognize we have some pretty massive deficiencies compared to many foreign services, and I will look forward to working with you and people in your Department.

Secretary SHULTZ. I appreciate that, and I will welcome support for language training and greater linguistic abilities. It just makes a big difference to a person at a post.

FOREIGN ECONOMIC AND MILITARY ASSISTANCE MIX

Senator SIMON. There is just no question, and I could go on with illustrations. Let me shift before my time starts running out here. Senator Conrad just alluded to the mix between military and economic foreign aid. I have a variety of statistics, but let me just use one.

Since 1981, the mix of economic assistance to foreign military aid has changed from a 50-50 split to almost two-thirds military aid. That is a shift, and while your figures may differ, I do not think there is any question that this shift has taken place, whether it is two-thirds or whatever your precise figure.

That is one of the areas where some of us have serious concerns, and I see Peter McPherson is going to give you the figures here now.

Secretary SHULTZ. I will just read this paragraph that he has handed to me. Here is the fiscal 1988 picture, and you cannot see this.

Senator SIMON. It is more effective that way if I cannot see it, Mr. Secretary.

Secretary SHULTZ. I will bring it to you.

Senator SIMON. OK.

Secretary SHULTZ. Here is the bilateral economic assistance, the multilateral economic assistance, the food assistance. Here is military assistance for MAPP and FMS, and then there is various administrative, information and exchange aspects.

If you look at this chart versus this chart, the economic is larger than the military assistance.

Senator SIMON. OK, thank you. Your figures and the Congressional Research figures here do not mesh. I will take a look at this and I would appreciate——

Secretary SHULTZ. Well, let me make a comment. There is a category called Economic Support Funds that is, in some people's minds, associated with military aid. It is designed to support from an economic standpoint infrastructure, and so on, that helps the economy in an area where we have a military interest.

So if you count economic support funds and development assistance as both economic and the things that go strictly for weapons procurement and military training, and so forth, as the military, then in the fiscal 1988 budget, the military side is $5.8 billion and the economic side is $8.8 billion.

If you lump the economic support funds with the military, then that proportion would be different, and that may be the reason why these things look——

Senator SIMON. That is my guess. My guess is how do you define a bridge built somewhere as military or economic assistance, but I guess there are some of us who have concerns that we are maybe skewing things in the wrong direction.

ASSISTANCE TO AFRICA

Also, you have in the budget a $500 million special fund for Africa to be allocated from existing sources. Number one, are we talking about any of this going for military?

Number two, how is this different from what we are doing now and how would this be allocated?

Secretary SHULTZ. Our military assistance in Africa is negligible. So, basically, what we are talking about is economic assistance of various kinds. What that $500 million represents is essentially a repackaging of funds that were designated for countries or functions and kind of got categorized in a way that seemed to make them less useful.

In the course of hearings and discussions with members of Congress in both the Senate and the House, it was really more of a congressional suggestion which we felt was good. There came the notion that we should set out this amount of money and then we will try, within that framework in Africa, to use it with some flexibility to serve different things that we want to do.

Legislation was offered in the Senate by Senators Kennedy and Kasten, and in the House by Chairman Dante Fascell. I might say Senator Kassebaum held extensive hearings that brought this idea forward, and that is the reason it is packaged that way in the budget.

There is also, I think, a desire to hold that money in there for Africa so that we do not have an erosion because, as I was saying earlier, what tends to happen is that we come in for some total, as shown on the projection, and then there are certain items that do not get cut at all, but the total gets cut.

You people put down a number and if the number is lower than our number—I hope it is not, but if it is and then a big proportion of what is in there does not get cut at all, the rest gets cut to beat the band, and Africa has taken an awful beating in that process.

So I think Senators Kennedy and Kasten and Kassebaum and others that have had a special interest were trying to earmark this point.

Senator SIMON. If I can just take 30 more seconds, Mr. Chairman, let me simply commend you for your interest in the African situation and your trip there. There is no question that Africa too easily gets neglected in this whole process.

Thank you, Mr. Chairman.

Chairman CHILES. Senator Sasser.

Senator SASSER. Thank you, Mr. Chairman.

Mr. Secretary, I, too, want to join in the accolades that my colleagues have heaped on you this morning, and I think you have been a steadying hand in American foreign policy and have furnished us with a sense of continuity at a time when it was desperately needed.

DEFENSE COST OF WEST TOO HEAVY ON UNITED STATES

Having said that, Mr. Secretary, I am troubled, and have been troubled for some time, about what I perceive to be a disproportionate share defending the free world that is being borne by the taxpayers of this country.

Now, I have seen studies that indicate that we are spending $140 billion annually just on the defense of Europe, and we see ourselves now almost half a century after the end of the Second World War with over 300,000 American troops in what we used to call the European Theater.

We are spending another $50 to $75 billion on the defense of the Far East, and that is primarily the defense of Japan. That is sort of the meat of the coconut as far as we are concerned in the Far East.

We are spending another $40 billion to provide deterrents in the Persian Gulf-Southeast Asia region. All totalled, that comes to somewhere in the neighborhood of $235 to $255 billion that we are spending around the world defending the frontiers of freedom, thousands of miles from the shores of the United States.

Let us take the Middle East. In the Middle East, we are providing the lion's share of security for the West's oil supplies there, and I say the West with some hesitation because the United States only gets 3 percent or less of its oil from the Persian Gulf. Western Europe is getting about 50 percent and Japan is getting 90 percent of its oil out of the Persian Gulf.

But, Mr. Secretary, the United States is spending, as a percentage of gross national product, almost twice as much for defense as our Western European allies are, around 6 percent of GNP.

Of course, it is a well-known fact that the Japanese are only spending 1 percent of GNP on defense, and I am well aware of their constitutional limitation. I am well aware, also, that constitutions can be changed.

HOW IS U.S. SHARE JUSTIFIED

My question to you, Mr. Secretary, is how do we continue to justify to the American people spending almost $1,000 for every man, woman and child for the defense of the free world while our allies collectively are contributing only about $250 per capita?

How do we justify it here as we approach the year 2000, almost a half century after the Second World War has ended and when the economies of many of these nations that we are defending are much stronger than that of the United States?

Secretary **Shultz**. We justify it on the grounds that our freedom and liberty is the most precious thing we have got, and I think our spending to defend that most fundamental value is a bargain.

In order to do it in the kind of world that we have, we must work with friends and allies. Think to yourself of how the world would look to us if, instead of the kind of outlook that you see in the Japanese government or in the governments of Europe, you had a Soviet-dominated situation, and how would we feel.

We are much better off to have friends and allies who share our point of view and to work with them and to be able to project ourselves. We, of course, talk all the time about burden-sharing, and we do it within NATO. There are various kinds of burdens.

Of course, troop levels in Europe are mostly European, although we have a major commitment of troops, but it is a joint enterprise in NATO. Japan also contributes. We talk about the so-called 1-percent ceiling, and the Japanese work at that.

There are great ambivalences in Asia, in Japan and in other countries, about a revival of a very strong military in Japan. Japan has had its experiences with that and its neighbors have had experiences with that.

They are not so sure they want that, but what we say to the Japanese is that what you should do, you ought to step up your economic assistance to a greater degree, and they have gradually been doing it, although often in a way that ties into their own trade desires. But, nevertheless, we think that is a point to put to them hard, and we do put it to them.

Senator **Sasser**. Mr. Secretary, I share some ambivalence about encouraging a massive Japanese defense effort. I am not eager to see those Toyota factories turning out tanks instead of automobiles.

I am not interested in seeing the Japanese totally reawaken militarily. What I am interested in is seeing some more equitable contribution to a defense of the free world. Now, let me just lay out a scenario where I think they could help.

SHARE COST OF RAPID DEPLOYMENT FORCE

I am chairman of the Appropriations Subcommittee on Military Construction. We have approved over $1 billion for contingency facility construction in the Middle East region. This will involve contingency facilities for a rapid deployment force in that area.

Hundreds of millions of dollars are still yet to be programmed for facilities in that part of the world. Now, I do not see why you and your colleagues in the State Department and your colleagues in the Defense Department cannot go to our NATO allies and go to our friends in Japan and say to them we cannot continue to sustain this burden; we cannot continue to sell it to the Congress of the United States because they cannot continue to sell it to the American people, and how about coming up with some funds to help us build these contingency facilities in the Middle East to house these rapid deployment forces, if they are needed to help defend your vital oil pipeline out of the Persian Gulf?

I think that is the kind of thing that the Japanese certainly ought to be able to do, and I think if our NATO allies are pulling 60 percent of their oil supplies out of that region, they ought to be able to cooperate in that regard, also.

My time is up, but if I could just be allowed, Mr. Chairman, one observation before concluding, there is a lot of publicity now surrounding the whole question of the Iranian arms deal; who did what, who knew what, when did they know it.

It is getting all the headlines, but in the view of this Senator, that is really not all that important in the long haul of history. I think it does reflect a lack of coordination in the field of foreign policy that is extremely troublesome, but I think you have done all you could, Mr. Secretary, to deal with that problem.

ICELAND A FAILURE

But if there has been a major foreign policy failure of this Administration, in my view it took place in Iceland. I think we had a real opportunity on the long journey back from nuclear confrontation, a real opportunity to start a build-down in nuclear weapons, and we blew it.

We came back from Iceland empty-handed. This opportunity may present itself again. I think it probably will, but we cannot be sure of that. Frankly, I am doubtful that it will present itself again during the course of this administration.

So I just wanted to say that, Mr. Secretary, and if you have any reaction, I would be pleased to hear it.

Secretary SHULTZ. Perhaps I could ask that the record have inserted in it at this point again my answer to Senator Exon, because I view Reykjavik differently. You, in a sense, asked a question on the other side of the criticism from the one that Senator Exon was voicing.

On your side, I would say I agree totally with the President in his refusal to scuttle the Strategic Defense Initiative at that meeting. I think he was absolutely right.

Nevertheless, a lot was accomplished and we continue to work hard to try to capitalize on those accomplishments.

Chairman CHILES. Thank you, sir.

Senator Grassley, I will call on you.

Senator GRASSLEY. Thank you, Mr. Chairman.

WEAKNESS IN INTELLIGENCE SERVICE

Mr. Secretary, if I could, I would like to kind of take up where I left off when I had to go to a meeting to question Mr. Sharanskiy on a Soviet Jewry matter. From our last discussion we had here, we obviously have some major disagreements because I would contend that there are serious weaknesses on the part of our intelligence services in Lebanon.

LACK OF POLICY IN LEBANON

There is total confusion in Lebanon, and it seems that it stems directly from our lack of policy there. I would contend that the back-channeling, the one instance that made the press, is not an isolated instance.

I get the impression, Mr. Secretary, that you feel that our integrity and our credibility in that area has not been damaged, so this is my question: Are you saying that there is no attempt right now to repair our intelligence network in Lebanon or to reformulate U.S. policy there, in light of what has occurred as a result of the Iran affair?

Secretary SHULTZ. Well, an awful lot of statements and assumptions were contained in your question and I will not try to go back and comment on each one, but I will just note them and say that I do not agree with all of them.

Senator GRASSLEY. OK.

Secretary SHULTZ. The basic fact is that the President and Mr. Casey, with the cooperation of everybody, including members of the Congress, have been very busy in the last 6 years trying to strengthen our intelligence capabilities, and I think there has been a great deal of success, but that does not mean that the situation is exactly the way you would like it. So there is still room for improvement, but there has been a great deal accomplished, in my opinion.

As far as Lebanon is concerned, it is a country in a very considerable state of chaos. I do not disagree with you about that, nor do I disagree that it would be desirable if that were not so, but I do not think that there is some magic wand that we can wave here that will make it so.

You mentioned earlier the failure of the May 17 agreement, which was an agreement that I helped to bring about. It did not come into effect, but I do not think it was a failure. I think that it served a number of important purposes.

As a matter of fact, it may be that there are some people in Lebanon right now who wish that they had been able to put it into effect because maybe the situation would be better than it is.

But it registered, among other things, in a very clear and affirmative way that Israel was prepared to leave Lebanon. Its concern, in other words, was for its own security on its own northern border, and if adequate arrangements could be made for that, it was not coveting Lebanese territory.

There was a lot of debate about that at the time and I think it was worthwhile to clarify that, and that was a helpful move.

I think also in the agreement there were set out ideas about how to cope with the security issue, and those ideas have been useful. So I think we have tried to be constructive in Lebanon, but as it has turned out, Lebanon has become a very chaotic place.

Senator GRASSLEY. Well, would your response be any different if I clarified that I am talking about intelligence in Lebanon and not the intelligence community generally as a focus of criticism? If I did not make that clear, I want to make that clear.

Secretary SHULTZ. Certainly, we can stand to improve ourselves in Lebanon. I am sure that people in the agency would be glad to go into this matter with you as to what we are doing and what we are trying to do. I do not think a public hearing is the place to do it.

POLICY TOWARD TERRORIST INFRASTRUCTURE

Senator GRASSLEY. Are we considering a policy towards the elimination of the terrorist infrastructure in Lebanon?

Secretary SHULTZ. We have a policy on terrorism; we have policies on Lebanon.

Senator GRASSLEY. To eliminate that infrastructure that supports it?

Secretary SHULTZ. Well, the terrorist arrangements in Lebanon are part and parcel of the general chaos there, and we struggle at it. That is one reason why we stay there and we continue to have an embassy there.

Many people have said, why do you not just pick up and leave? We stay there because it is a place from which a lot of problems ensue, so we continue to work at that.

Senator GRASSLEY. OK. Well, let me take off from the word "chaos," then, and say that I am sure you are aware that the Soviets are working very hard to penetrate the Christian communities in Lebanon and to establish pro-Soviet sympathy in those regions, in hope of further destabilization in that area.

Now, before the Iran affair, the Soviets had neither the momentum nor the rationale for such efforts, and now, of course, they do. To me, Mr. Secretary, I think this highlights the seriousness of our Iran arms affair.

Of course, I also think it drives home the point of disagreement that you and I have had in this exchange this morning.

DIVERSION OF DIPLOMATIC SECURITY FUNDS

Can I ask another question in another direction towards the $600 million that we have spent over the past 2 years for diplomatic security? It is my understanding that in this request there is another $400 million for this year.

Mr. Secretary, I would like to have you assure me and this committee that there is no diversion of funds occurring in the last 2 years from the diplomatic security account to other functions within the Department.

Secretary SHULTZ. I give you that assurance, and we keep track of it very carefully.

OPERATIONAL COUNTERTERRORIST DIVISION

Senator GRASSLEY. OK. The State Department is the lead agency in dealing with counter-terrorism. Do you have an operational counter-terrorist division for responding to instances of terrorism abroad?

Secretary SHULTZ. We are the coordinating agency. We have an ambassador-at-large, Ambassador Bremer, who is the person with overall responsibility in the government. We undertake the management of various training activities and when a crisis occurs, we organize a crisis center in the State Department and an operations center room, and Ambassador Bremer works there and with the White House in his coordinating function.

The assets that may be used—for example, an airplane or a ship or a J-Sock group or something, or perhaps some other facilities—usually are lodged in some other department and what is needed is to coordinate their use and decide on their use, and that is, of course, something that winds up coming into the domain of the President and the White House.

Senator GRASSLEY. The key word in my question was "operational" counter-terrorist division. Do you have one?

Secretary SHULTZ. I have tried to describe the way the government is structured.

Senator GRASSLEY. Well, do you describe it as——

Secretary SHULTZ. If operational counter-terrorism is a J-Sock team, for example, the answer is that is located in the Department of Defense, but it is to be used in a coordinated way, if called upon.

Senator GRASSLEY. Well, let me ask you this, then. Would an operational——

Secretary SHULTZ. Or in the case, just to take an example, of the Libya raid, that was carried out by the Department of Defense after discussion all around. Or in the case where the President ordered a carrier to bring a plane down that was carrying terrorists, that was executed by our Navy, and very well.

Senator GRASSLEY. Well, would it be useful, in your view, to have an operational unit within the State Department?

Secretary SHULTZ. I think that the method of having these kind of operational activities located in the departments that have the competence to conduct a military operation, for example, is the best way to do it, and the key is to be able to coordinate it adequately, all of the aspects—the diplomatic, the political, the possible military, and so on.

Senator GRASSLEY. You view this, then, from the angle of your Department being the lead agency in counter-terrorism?

Secretary SHULTZ. Yes; we have the lead in this coordinating function.

Senator GRASSLEY. And your response is that that is best performed, then, by having these operational units in another department?

Secretary SHULTZ. I do not think we should want to mount in the State Department a military unit of some kind. It would be a mistake.

UNITED STATES PATIENCE RUNNING OUT WITH JAPAN

Chairman CHILES. Mr. Secretary, you mentioned the problem we have with the Japanese. Because of their constraints, they cannot increase their military outlays assistance.

But we find that economic assistance basically exacerbates our problem because they turn around and lock countries in to where they must trade with Japan. We have a very tough time somehow trying to make the Japanese realize our patience is wearing thin.

I guess that is because we have taught them that we will continue to go along, no matter what they do, whether it is their trade deficit or whatever. How do we get the message to them that their time is running out?

Secretary SHULTZ. Well, we have been taking it to them and I know that there are innumerable congressional delegations, Senate and House that go and speak to them about it. I think that is a good thing.

We have mounted negotiations on particular areas, and those have been reasonably successful. Also, we have put forward the more fundamental critique both of them and ourselves of what it takes to make a real change in this.

Just to state my opinion about it, on the Japanese side they have a chronic tendency to save more than they invest, and therefore if their economy is going to remain fully employed, they will have to export more than they import. That is the arithmetic.

SLOT MACHINE TRADE

Chairman CHILES. Which makes them a trade predator. Right now they are importing 20 percent of what they are exporting. That arithmetic sort of says that if you are going to play with Japan, it is like putting your money in a slot machine that pays off 20 cents on the dollar.

Secretary SHULTZ. Well, I do not think their imports are as little as 20 percent of their exports. Obviously, from what I have said, they export more than they import. The point of my comment was that it takes more than changes in trade arrangements to lead you to think that that imbalance will change itself.

Now, in the light of this—and I have spoken about this, and others have, directly to them—there was appointed in Japan by the Prime Minister a commission named the Mayakawa Commission and they made a report to the Prime Minister that elaborated on, but nevertheless basically developed this theme and combined it with operational suggestions.

The Japanese have been considering this and working at it, and I think that while there is obviously a long ways to go and some aspects of their current budget are disappointing to us, nevertheless there is the beginning of grappling with it on that side of it.

FISCAL DEFICIT BIG CAUSE OF TRADE DEFICIT

On our side of it, I hate to say this because I am arguing for this full amount in my own little budget, which is not big enough to make that much difference in the overall deficit, but I think that our large fiscal deficit is not the only reason, but is a leading reason why we have such a large trade deficit.

Chairman CHILES. I agree.

Secretary SHULTZ. So if we are going to cure our trade deficit, we have got to do something about the fiscal deficit.

Chairman CHILES. If Japan opens its market to us 100 percent, we would still have a drastic trade problem with them. Part of that is because of our huge fiscal deficit.

Secretary SHULTZ. And part of the cause would be their savings/investment relationship.

TRADE DEFICIT AIDED BY DO NOTHING POLICY

Chairman CHILES. But at the same time, with all of their studies, I think I can remember when their trade deficit with us hit $15 billion. They rushed over here; there were a series of meetings held.

I was in on a number of those meetings, and they said they knew that gave us problems and they were going to take action. The next year the action turned out to be a $30 billion trade deficit, and we have seen that go on and on.

So they have studies. They give us the cultural reasons. On a product-by-product basis, they can give you every reason in the world; that their government falls if their mandarin orange producers are not protected, or their rice producers or their cattle producers or whatever it is. Yet, we see it go on and on.

At some stage, I think we have to recognize it is our fault because we never do anything. I think we have conditioned them to the fact that there is nothing we will do.

Our honeypot of markets will continue to be here; it is available for them. They can come and use those markets. They could be helping in some of these other countries by giving some aid. They could be relieving some of the pressure. But they are not.

I think we are at the point now where we really are not being fair with them unless we show them at some stage we mean what we say.

BUDGET DILEMMA

I want to put a chart up here. You mentioned our deficit, and this shows the problems we find ourselves in. This uses the CBO data to show where we are.

CBO DATA SHOWS PRESIDENT'S BUDGET MISSES DEFICIT TARGET BY $30 BILLION

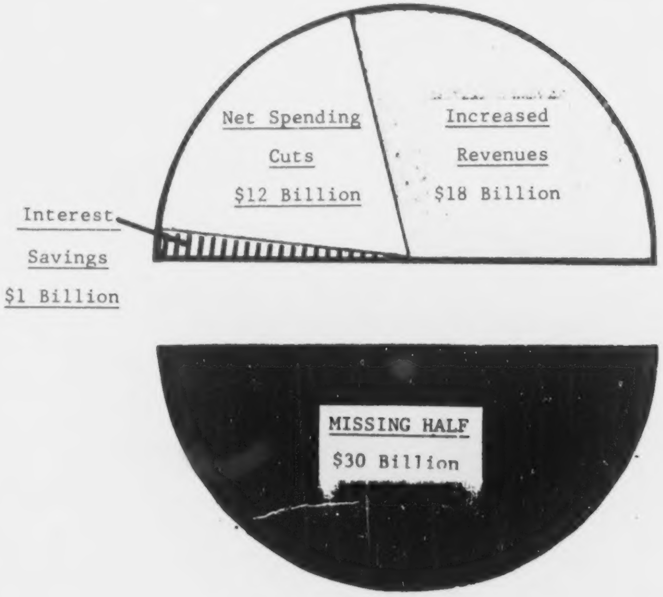
Half of $61 Billion In Needed Savings Are Missing

(In billions of $)

CBO DEFICIT ESTIMATE:	
Baseline----------	$169
G-R-H Target------	108
Needed Savings----	61
PRESIDENT'S PLAN:	
Net Spending Cuts-	$12
Revenue Increases-	18
Interest Savings--	1
Total Savings--	$31

PRESIDENT MISSED TARGET BY $30

PROPOSED SAVINGS



Senate Budget Committee staff estimates based on CBO data. January 22, 1987.

You see the President in his budget is talking about increased revenues of about $18 billion. He has net spending cuts of about $12 billion. Some $19 billion is proposed. But when we include the increases that will come from the military spending we come down to a net of about $12 billion.

We derive some interest savings because of that. CBO says about $1 billion. But we do not reach the Gramm-Rudman-Hollings targets. We are missing approximately $30 billion. That is the missing half.

You have heard around this table today a tremendous concern on our part. We are going to use the CBO numbers.

We do not know how we close the gap. Of that $12 billion in spending cuts, 70 percent have been proposed a couple of times up here and have been rejected by the Congress.

When we look at all areas, including what you call your small piece of the pie, and including all of the other areas, we still do not know exactly how we come to grips with the problem. Yet, we have to.

I think you realize how serious the deficit problem is and that if we do not deal with it we are going to be in trouble in trade. We are going to be in trouble because of the pressure it puts on all programs. That is the dilemma.

BUDGET SUMMIT NEEDED

We are continuing to say to the President, and we send that message again through you, help, help. Come, bring us together and let us sit down with you. Bring the leadership of the Congress from both sides of the aisle, the requisite people from Finance and Ways and Means, the Budget and the Appropriation, and let us see if we cannot come out with a package that puts everything on the table and persuades the American people we are serious about this.

I think it is the best signal we could send to the economy. So as we listen to your message, we hope you will listen to our plea and be an ambassador for your country in helping to convey this message.

Secretary SHULTZ. Thank you, Mr. Chairman. I am the witness and I am the one that brings the charts. [Laughter.]

WHAT IS RIGHT BASELINE

I think this is turning the tables on me, but I think the key here to that $30 billion that you have in the red portion of your circle comes from the baseline. Up on the left-hand side in the small numbers, there is the word "baseline" and "target" and "needed savings."

Chairman CHILES. Yes, sir.

Secretary SHULTZ. And the question is what is the right baseline, and I believe it is the baseline that varies and it mainly reflects different economic assumptions. As I said earlier, the administration can be right, the CBO can be right, the blue-chip forecast could be right.

There is a variation there, but it is, I think, a legitimate difference of opinion about what the economy holds for us. But that is the difference, where the baseline should be.

OPTIMISTIC ECONOMIC ASSUMPTIONS CAN CAUSE PROBLEMS

Chairman CHILES. Yes, sir. Our concern is that it is more than an academic exercise we are in. If we guess on the optimistic side, that is reflected next year.

When we left here we thought we had the deficit down in the neighborhood of $150 billion. We went home for the Christmas holidays and when we came back and it was $175 billion because we have been optimistic about revenues, the spend-out, in the farm programs.

We would love to have it be a lower number. But if it is not, we are the ones that suffer, especially if there is a sequester under Gramm-Rudman-Hollings. Think what would happen to your budget, the defense budget and to the other things that we do not want to think about if we talked about a $30 billion sequester across the board.

Secretary SHULTZ. I am shivering.

Chairman CHILES. Yes, sir. Well, I am, too.

We want to thank you for your patience in being here. Is there someone else who feels a pressing need to ask another——

Senator EXON. There certainly is down here, Mr. Chairman.

Senator SIMON. Can we just get one question apiece, Mr. Chairman?

Chairman CHILES. All right.

Senator EXON. I do not agree to that, Mr. Chairman.

Chairman CHILES. Mr. Secretary, can you do that? Can you do one question apiece?

Secretary SHULTZ. Yes, sir. I am at your disposal.

Senator EXON. Mr. Chairman, I am not going to agree to only one question. I have been very patiently sitting here. I do not want to impose on the time of the witness. I think it would be very proper if we asked the witness what his time constraints are.

Secretary SHULTZ. I am here to serve your pleasure.

Senator EXON. Then if you want to ask one question, fine. I reserve the right to ask more than one.

Secretary SHULTZ. I am here in the spirit that this budget problem is a very serious problem in its overall dimensions, but then, of course, I am here particularly representing the portion of it that falls more or less within my responsibility.

I believe it is extremely important in the interests of the United States that these proposals be funded. So I feel that our biggest foreign policy problem is our resource problem, and so I am here to talk to you about it.

Senator SASSER [presiding]. Well, the chairman has exited and so I am going to take his place while he is gone. According to the list that I have, Senator Sanford, you are next in line of questioning.

Senator SANFORD. If it suits the chairman and the Secretary, I will swap one question for two comments. I would like to examine more fully what we are doing on a regional basis in Central America, and maybe Mr. McPherson and others in the Department might furnish me additional information.

Secretary SHULTZ. Could we come around with Elliot Abrams and Mr. McPherson to your office and go through that with you? We would like to do it.

Senator **Sanford**. I would like very much to do it. I think we are making progress, but it occurs to me that we have to have a regional approach because each of those countries is too small to make much permanent economic progress on its own.

I think the history of the recent years, for all of our progress, indicates that we will not get anywhere unless we do.

ABM TREATY INTERPRETATION

My second comment is not really on the budget, but I think that I would like to make this comment for the record because I understood you to say that the counsel for the State Department, who is, doubtless, a very distinguished lawyer, had looked at the negotiations of the treaty itself and, on the basis of that, made an interpretation that broadened considerably our concept of the meaning of the ABM treaty.

I simply want to suggest that that is probably not a legally sound way to make an interpretation. He said, in effect, that the Soviets wanted a broader interpretation in the negotiations, so now we will give them one; that it suits us to do so.

But I think that we have to stick to the making of the record of the public policy itself, the discussions, the comments, the positions taken in the discussion in the Senate, in the committee, and that is the record that we have to look at.

I am simply suggesting that if we are going to change interpretation that we cannot cut off our consideration of the facts that will make that change at that point; that which was done in public, what the Senate thought it was doing in establishing policy, is most germane in the final interpretation of what the treaty means.

I do not want to take our time, since it is not really a budget matter, but I wanted to throw that legal opinion in for future considerations.

Mr. Chairman, that is all I have.

Senator **Sasser**. Thank you, Senator Sanford.

Senator Exon.

Senator **Exon**. Thank you very much, Mr. Chairman.

U.S. FOOD IMPORTS AND EXPORTS

Mr. Secretary, let me ask a question first about food production and how it affects our problems because I know you are very much concerned about that.

During the last year, there were 2 or 3 months when the food imports exceeded food exports in the United States, which was a rather dramatic turnaround, especially given the serious depression that we have in agriculture today.

It seems to me that this situation may pop up in the future and I am wondering if you anticipate that there will be a recurrence of that situation again in this current year current.

Secretary **Shultz**. Well, I am perhaps not the expert to comment particularly off the top of my head on what likely trends in exports and imports of farm products are. Certainly, we have a very strong agricultural community, one that we can be proud of, and which is very productive and cost-competitive.

I think like other exports, our farm competitiveness has suffered from the very high dollar exchange rates that have been in place in past years and, no doubt, the pricing of them will be affected by what has happened on currency exchange markets.

Senator EXON. I would simply say to you, Mr. Secretary, now that the prices have slid dramatically down and now that the dollar value has come down dramatically, it has not improved exports of food products. So I am only throwing that out for the consideration that that hypothesis that you have just cited does not seem to be working. Maybe it will at some point, but driving down agricultural prices is having a very devastating effect on certain rural areas of these United States.

Let me move to another question.

Secretary SHULTZ. Could I just throw in a comment?

Senator EXON. Yes.

FUTURE HOLDS MANY AGRICULTURAL PROBLEMS

Secretary SHULTZ. Again, not professing to be an expert on this—you are much more knowledgeable than I—but it does seem to me that there is a kind of technical, or whatever you want to call it, revolution such that, as you noted, more and more countries are able to produce the basic food that they need.

So I think that that is a fundamental fact that, over the long run, is going to have an impact on international trade in farm commodities. The whole thing is badly compounded by the subsidy programs of various parts of the world. I will not comment on ours, but it is extensive.

But I think, as I think Chairman Chiles put it, that much of this was triggered off by the common agricultural policy in Europe which encouraged production of things that would not be produced there in any quantity if you were doing it on a strict comparative advantage basis.

But I do think there is something afoot in agricultural commodities, and perhaps in some other commodities, that means the world of 5 or 10 years from now is going to be rather different from 5 or 10 years ago.

Senator EXON. Lots of problems is what you are saying?

Secretary SHULTZ. Yes.

WILL STATE BE BYPASSED ON FOREIGN POLICY MATTERS

Senator EXON. Earlier, I complimented you for the overall demeanor that you have had through these most difficult times. I suggested that if you were ever bypassed again, though, I would expect probably you would resign.

Has there been an understanding between you and the President since the Iran fiasco that you will not be bypassed again, you being the State Department, on future matters under your direct control as far as the White House is concerned?

Secretary SHULTZ. Well, I do not discuss my direct discussions with the President. That is between me and the President, but I have a very good, strong personal working relationship with the President, have had for years, and continue to have.

I have tremendous admiration for the President and feel that he has given great leadership. So I expect to work easily with him.

Senator EXON. You cannot answer my——

Secretary SHULTZ. I believe that the new National Security Advisor, Frank Carlucci, has taken hold in an outstanding way and I expect to have a good and candid, straightforward working relationship with him, and we have discussed the question of who does what, and so forth, and I believe the situation is satisfactory.

Senator EXON. You cannot answer my question directly, then, as to whether there has been an understanding that your Department will not be bypassed, as it obviously was, by your own admission, during the recent difficulty with the Iran situation?

Secretary SHULTZ. Well, I do not want to go into all that in great detail and I think it is a question of how much of that bypassing was something that the President was doing and how much was done as a result of other people's actions.

Senator EXON. Well, obviously, that may well be true, but my question then is, has there been any understanding that the State Department will be consulted on these things and their recommendations followed in the future?

In other words, it has been agreed that there was a vital mistake made by the President not being in full control of some of the operatives that worked in the White House?

Secretary SHULTZ. There is a National Security Decision Directive that sets out the responsibility of the Secretary of State as the President's chief spokesman and advisor on foreign affairs, and I expect to see that continue on and work fruitfully under that.

Senator EXON. Thank you. My time is up.

Senator SASSER. Senator Simon.

ECONOMIC/MILITARY FOREIGN AID

Senator SIMON. Yes, thank you. Let me go over again these military/economic figures and give you a sheet put together by the Budget Committee staff. If you will note the two figures that I have circled there, they show that in 1981 actual economic aid was $4.499 billion. The request for 1988 is $5.185 billion, something of an increase.

Military aid has gone from $2.543 billion to $9.352 billion in this budget, or roughly an $8 increase in military aid for each dollar in increased economic aid. That is what that frankly, concerns some of us.

Secretary SHULTZ. Well, here, Senator, is where this definitional question, I think, will clarify it.

If I say something that is not correct, you guys straighten me out, but what is labeled economic aid, $5.185 billion on your chart——

Senator SIMON. Right.

Secretary SHULTZ. That is the development assistance account, basically. What is labeled military aid, $9.352 billion, is composed in part of what one would think of as military, as such; that is, FMS and MAP assistance that goes directly to the military. That amount is $5.863 billion.

The balance, which would be the difference between the $9.3 billion and the $5.8 billion, is what is called Economic Support Funds. Now, in the numbers that I read out to you, which come to the same total as the numbers you gave, I included the Economic Support Funds with the Development Assistance because it essentially is going to economic matters.

When you do it that way, the breakout is, as I said, $8.8 billion economic, $5.8 billion military. If you take Economic Support Funds and lump it with the military, then these numbers—so that is the reason for the difference in the numbers.

Senator SIMON. OK. Apparently, in 1981 we shifted that Economic Support Fund over to the military category in terms of how we put the budget together, and maybe that is improper.

I guess one of the things I want from your people and from our staff is a breakdown of that $3.6 billion requested for the Economic Support Funds.

I see that Mr. McPherson there may want to comment.

Mr. MCPHERSON. Yes, Senator. That $3.6 billion, which incidentally is roughly the amount we had appropriated last year and the amount we are requesting in fiscal 1988, is, in my judgment, very much economically oriented.

Secretary SHULTZ. Give some examples.

Mr. MCPHERSON. Well, for example, we have Economic Support Funds going to Kenya. Some of it is involved in agriculture programs. Most of what goes to Pakistan is Economic Support Funds, with almost no Development Assistance. There, we are doing everything from agriculture to family planning, health programs, just a whole range of activities.

Indeed, over $1 billion of that ESF is projectized much as the Development Assistance programs that you know so very well. I honestly feel, and feel strongly, that it is a mischaracterization of ESF to place it in the military category.

Indeed, in recent weeks I have been talking to the Overseas Development Council about the idea that maybe they would come in and do a study because I think that this notion that this is somehow or other military aid is not really correct.

I have worked hard at being sure that ESF has had the maximum economic impact, along with being directed at needy countries.

DISPROPORTIONATE SHARE OF AID TO MILITARY

Senator SIMON. Well, I would be interested in getting from either of you a breakdown here, so we really have a feel for where we are going. If you just look at the figures that I gave you, it clearly indicates that there is a disproportionate growth in military assistance. Even if you assume ESF is taken out, there is still a tilt that I think is probably not desirable.

But, clearly, a key is what that Economic Support Fund goes for, and I would be interested.

Mr. MCPHERSON. We would like to really get into that with you, Senator, because I think our base economically is a very good one.

Senator SIMON. OK, I look forward to that, and I thank you, Mr. Secretary. Thank you, Mr. Chairman.

Senator SASSER. Senator Exon, do you have additional questions?

Senator EXON. Yes, I do have a couple of questions that I do not think will take a great amount of time.

Mr. Secretary, this does not have directly to do with the budget, but it has to do with some responsibilities that I have over in the Armed Services Committee with regard to arms control and arms negotiations.

You thought Reykjavik was a success—and I hope it was. I do not share some of the pessimism with regard to never coming to an understanding with the Soviets during the last 2 years of the Reagan administration.

I hope that is not true because I firmly believe that President Reagan is in a better position right now to come to some kind of a workable, verifiable agreement with the Soviets, much more so than the next President of the United States, whether that individual be a Democrat or Republican. So I am a little more optimistic.

But along those lines, I am concerned about the fact that we have now broken the SALT II agreements, which gives the Soviets a chance to expand where they have not been expanding.

KEEPING SDI IN LABORATORY 10 YEARS

I particularly want to know what was your understanding of what the President proposed at Reykjavik with regard to keeping SDI in the laboratory for 10 years? I believe that had to do, did it not, with the Soviets accepting some of the proposals that he, the President, had laid down with regard to reduction of INF and ICBMs?

Did the President not tentatively agree under some conditions that he would keep SDI in the laboratory for 10 years?

SOVIETS PROPOSE CHANGING TREATY

Secretary SHULTZ. No, sir, he did not. There are two different things that are being mixed in here. One is the definition of permitted activity under the ABM treaty, and the Soviet proposal was basically to change the ABM treaty, at least this is the way we saw it, so that the permitted activity would not be what the ABM treaty now allows, but would be whatever it is that is confined to a laboratory.

Senator EXON. Which is—let us establish this—which is that you can deploy one system in a particular area for ABM defense?

Secretary SHULTZ. No, sir. That is a different—let me distinguish between permitted activity in research, testing and development under the ABM treaty. That is one category of things.

The Soviets proposed to restrict more than the ABM treaty does, or at least so it seemed to us, that kind of permitted activity. That is what you need to do to learn. Now, a different question has to do with deployment.

Under the ABM treaty, as you know, each side is permitted to deploy a ground-based system of defense against ballistic missiles, and you are limited to 100 interceptors. The Soviets have deployed such a system. It is the only ABM system deployed in existence around Moscow.

We have chosen not to, but if at any time we changed our minds and decided we wanted to do that, we could do so completely consistent with the ABM treaty.

PRESIDENT'S PROPOSAL

Now, the President listened to the Soviets there and earlier and as we were preparing ourselves for the meeting and as we had exchange with the Soviets, he had earlier sent Mr. Gorbachev a letter, and this is a matter of record, proposing that each side confine itself to the research, and so forth, as permitted by the ABM treaty for 5 years, and that if, at a time thereafter, either side felt that it had something it could deploy and wanted to deploy that he further proposed that there be a 2-year period during which there would be discussed, (a) the possibility of sharing defensive ideas and, (b) the elimination of ballistic missiles.

So you have five plus two; you have the idea of elimination of ballistic missiles.

Senator EXON. That is a maximum of five plus two, right?

Secretary SHULTZ. No, sir; that is a minimum; that is, you have five and then you have a period of time, "*x*." "*X*" may be zero or "*x*" could be some additional number of years, but it is whenever either side says I have a defensive system that can be deployed and I am announcing that to you, and then comes the 2-year period of mandatory negotiation.

As you know, either side has the right under the treaty to withdraw from the treaty, upon 6-months notice.

Senator EXON. Right.

SOVIET PLAN WOULD CRIPPLE SDI

Secretary SHULTZ. So at Reykjavik, the President took these earlier ideas and the concerns the Soviets were expressing about the need for a length of time—and you remember some of their earlier proposals were 15 to 20 years of nonwithdrawal or things like that—and tabled a proposal that said let us agree to a 10-year period of non-withdrawal and during that time, in the first 5 years, would be the 50-percent reduction in strategic arms that had been worked out to a degree the day before, and in the second 5 years the balance of ballistic missiles—not strategic arms, but ballistic missiles—would be eliminated.

The Soviets did not buy that, and they wanted to confine our permitted research in a way that we felt would cripple the program.

Senator EXON. Thank you, Mr. Secretary.

Secretary SHULTZ. Also, we never came to any agreement about what happens at the end of the 10 years. So in that whole area, there was some useful shifting of positions, but there was no real agreement.

U.S. EXCEEDING SALT II LIMITATIONS

Senator EXON. Thank you, Mr. Secretary, and thank you, Mr. Chairman. One last quick question. Did you agree with the President's decision to exceed the SALT II treaty limits by the failure to retire two of the Poseidon submarines?

Secretary SHULTZ. I support the President's decisions on what he decided earlier on in making the statement about the SALT II treaty and in the inevitable follow-on to it as this question arose of whether to roll out the bomber and what to do about the submarines.

Senator EXON. So you support the President in his exceeding the SALT II limitations?

SOVIETS KNOWINGLY HAVE EXCEEDED LIMITS

Secretary SHULTZ. I support the President. I believe that a better way to put it and a more accurate way to put it is that the Soviets have long since violated the SALT II treaty both in their development and deployment of a socalled second type of missile and in their heavy encription.

That being the case and we having called that to their attention strongly and gone the extra mile, it was not sensible for us to observe all aspects of the treaty, and also not sensible to have them say, well, we will live up to the part on certain kinds of numbers that we are ready to live up to, but we will violate other parts. That is no way to treat a treaty; you have to obey the whole thing.

Senator EXON. Thank you, Mr. Chairman. Thank you, Mr. Secretary.

NEW UNITED STATES AND SOVIET EMBASSIES

Senator SASSER. Mr. Secretary, let me ask you some questions about the status of the Moscow embassy. I was in the Soviet Union a couple of years ago and, clearly, the present embassy there is inadequate, it is overcrowded, it is antiquated.

What is the status of our new embassy building in the Soviet Union? I note that the Soviets appear to have completed theirs out on Wisconsin Avenue. I do not see any construction going on out there now and it appears to be available for occupancy. When can we expect ours to be completed?

Secretary SHULTZ. As far as our work in Moscow is concerned, as I understand it, basically the aspects of the construction program other than the chancery itself are basically done and people have moved into them. They are basically living quarters and things of that kind.

The chancery is well along in completion. It is not so much the completion in a kind of technical sense as you would normally think of it in a construction job. It is more the problem of how you build something in the Soviet Union and minimize the amount of eavesdropping built into it, and that is hard and it causes delays and runs up expenses, and so forth.

Now, as far as their complex is concerned, they will not be able to use their chancery until we are able to use our chancery, and they understand that very clearly.

PROBLEM DEBUGGING U.S. EMBASSY IN MOSCOW

Senator SASSER. Well, Mr. Secretary, the Moscow embassy has become controversial, as you know, and one of the problems with trying to debug the construction itself has been the fact that the State Department allowed portions of the building to be prefabricated off-site by the Soviets and then brought the prefabricated portions on site for inclusion in the embassy construction.

Certainly, I think any good Soviet KGB officer would be delinquent in his duties, as they view their duties, if they did not try to infiltrate those construction crews and put into these off-site prefabricated portions of the building eavesdropping equipment.

Secretary SHULTZ. May I make a comment on that?

Senator SASSER. Yes, you may, sir.

Secretary SHULTZ. The construction work in Moscow preceded with reviews by all relevant agencies. There is material in the chancery, as you suggest, that was purchased in the Soviet Union. That happened in the 1960s and 1970s, probably, and it constitutes a problem.

We are working at it and I hope that we find ways of dealing with it adequately. There are ways to deal with it.

Senator SASSER. Well, there is some dispute as to exactly when that did occur, Mr. Secretary. I am advised that the actual purchase of these prefabricated portions of the embassy occurred in the 1980s, as opposed to the 1970s.

INCREASE IN EMBASSY CONSTRUCTION FUNDS

But you are requesting a 73-percent increase in funds for embassy construction in this year's budget, and this increase will come on the heels of several years of significant increases in funding for embassy construction and security.

Of course, given the state of affairs around the world, with terrorists seeking to place the lives of our ambassadors and State Department personnel in jeopardy, it is understandable that there would be substantial additional increases for security at the various embassies around the world.

DEPARTMENT MANAGEMENT OF CONSTRUCTION INADEQUATE

But this whole question of security for the embassies, building new embassies, additional embassy construction, represents a sizable management task for the State Department, and there is some question as to whether current projects, construction projects, are adequately managed by the Foreign Building Office.

Questions are being raised about their ability to handle an additional workload. Now, as you know, investigations over the past year by the General Accounting Office, the House Committee on Government Operations, the staff of both the Senate Foreign Relations Committee and the staff of this Senate Budget Committee have all raised questions about sub-standard designs at our embassies around the world, questions about poor contracting procedures, questions about shoddy workmanship, questions of inadequate management, lengthy delays, maor cost overruns on many projects.

USE CORPS OF ENGINEERS EXPERTISE

Given these questions, reports, and investigations, and realizing that you are asking for, and will probably receive, Mr. Secretary, a very significant increase in funds for embassy construction, and realizing that your Foreign Building Office is already stretched pretty thin, I wonder what your Department would think of using the resources of the Army Corps of Engineers to help solve the problems found in some of these embassy projects around the world, specifically Cairo, Damascus, Moscow, and elsewhere. What is your reaction to that, Mr. Secretary?

Secretary SHULTZ. I believe the operation of the Foreign Building Office was sub-par in past years, and I am interested that you brought up the Cairo one. That one has been investigated about 5 million times. It is a good one to investigate because it is a mess, so if you want to find a mess, go investigate it. It was badly managed, it was badly conceived.

The irony of it all is that it has been sold and we have made money on it, so we are ahead of the game.

I do not have any problem with accepting criticism on that, and I am sure things are not always done exactly right. However, the need for this program was worked up through a procedure involving the so-called Inman Panel. It is an outstanding, small group that looked at all of these security problems—not only physical security, but counter-intelligence—and formulated recommendations which we have basically accepted.

Senator Rudman was a member of that committee and Congressman Mica in the House was a member of that committee. It is a good report.

As to the management of the whole thing, we have rearranged the FBO very drastically under Ambassador Spiers. direction, and I think that we now have a system that is able to manage not only individual things better, but able to manage a broad program.

There will always be problems. I keep track of them. Right now, we are basically on time and on budget and our procedures look pretty good to me. I think I bring some credibility to that because before I was Secretary of State, I was president of a company which, at the time, was perhaps the largest engineering construction company in the world.

I have walked lots of jobs and I think I know something about how to organize them, and I feel that we have made great strides. Naturally, I think the company I was with could do it all better, but anyway private enterprise is generally better at these things, and we have tried to enlist private enterprise in this management process directly.

Senator SASSER. Do you have additional questions, Senator Exon?

Senator EXON. I have no further questions.

Senator SASSER. Mr. Secretary, I want to thank you for appearing here this morning and doing your usual able job in representing the views of the Department of State as we look to the fiscal year 1988 budget.

These hearings are adjourned.

Secretary SHULTZ. Thank you, Mr. Chairman.

[Whereupon, at 12:47 p.m., the committee was adjourned.]

SCIENCE AND SPACE TECHNOLOGY

WEDNESDAY, FEBRUARY 4, 1987

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Washington, DC.

The committee met, pursuant to notice, at 10:07 a.m., in room SD-608, Dirksen Senate Office Building, Hon. Lawton Chiles (chairman of the committee) presiding.

Present: Senators Chiles, Sasser, Riegle, Exon, Lautenberg, Sanford, Wirth, Domenici, Symms, Grassley, and Danforth.

Staff present: Richard N. Brandon, staff director; and Douglas Olin, assistant director for budget systems.

For the minority: G. William Hoagland, staff director; and Bill Hughes, senior analyst for transportation and science.

OPENING STATEMENT OF CHAIRMAN CHILES

Chairman CHILES. Good morning.

Today, we are pleased to welcome a panel of distinguished guests to a hearing on science and technology. With us are Erich Bloch, the Director of the National Science Foundation; Dr. Alvin Trivelpiece, Director of the Office of Energy Research for the Department of Energy, and Dr. Ian Ross, president of Bell Laboratories.

CIVILIAN R&D NOT KEEPING PACE

It has been nearly 60 years since John Dewey said that every great advance in science has issued from a new audacity of imagination. What troubles me is that it was the audacity of our enemies that spurred our atomic research in the 1930s and 1940s. It was the audacity of the Soviets with Sputnik in 1957 that spurred our rocket research. And today, it is the audacity of foreign producers that finally is making us aware of our competitive shortcomings.

It seems to me that we can do better than to let others set the agenda for us. With all our talent, imagination and know-how, the United States should be the world pace-setter in every area of high-technology.

We set the pace in military research. In the last 6 years, research and development for the military grew 124 percent. Between 1965 and 1981, R&D funding grew about 8 percent a year, and it was about evenly split between military and civilian spending.

But when you put our research R&D up on a chart, you notice that the civilian line is fairly flat—in fact, it does not even keep pace with our inflation as a level of investment. And yet when we look at the other side of that, our rate of advancement is also going to be flat. That is what has happened to us in the last several years as other nations have poured more and more into their civilian research efforts.

BOOST FOR SCIENCE EDUCATION

Just last week, the National Science Foundation introduced a new plan to boost science education in grade schools. That is certainly a step in the right direction. It was only 6 years ago that the administration proposed to eliminate funding for that type of science education, so that change is certainly welcome.

When this new program was announced, one of the assistant directors at NSF told reporters that the United States had been failing "to provide an adequate background and an adequate level of science literacy for the population as a whole."

It seems to me you have both sides of the coin in that announcement. It is fine that we are trying to introduce better science education into the elementary schools. But we have known there has been a problem there for quite some time, and a lot of people would ask why didn't we do something sooner.

"BIG SCIENCE" PROJECTS ANNOUNCED

This administration has announced several "big science" projects—SDI, the space station, and last week we heard about the go-ahead for the $6 billion Supercollider. It is supposed to keep us in the forefront of physics, and it is the kind of spearhead project we would expect of this country.

I want to ask a couple of questions at the same time. Are there enough scientists and engineers to pursue all these projects and meet the needs of the marketplace? There is no money in the budget for the Supercollider. It was not even mentioned in the budget documents. How are we going to pay for it?

What I am afraid of is that it is a worthwhile project, but it could be a resource carnivore, eating up funds that might otherwise go into other critical, though less visible, projects.

I think this country has gotten impatient. We want to do more. We can do more. Everybody is talking about competitiveness now.

ESTABLISH A NATIONAL RESEARCH STRATEGY

But to do more, we need to establish a national research strategy. We need to provide funding for the "big science" initiatives and to make sure the smaller, innovative projects get solid backing.

We have to come up with a plan that takes into account applied science as well as basic science. We want to continue the basic research while making sure we can take what we find and put it to work in our daily lives.

What we really need is a little audacity of our own.

We have to do our best. And America's best is pretty good. We can take important steps in our comeback if we make this budget an engine of change. We certainly want your help. We need it, and we look forward to your testimony.

Senator Domenici?

OPENING STATEMENT OF SENATOR DOMENICI

Senator DOMENICI. Thank you very much, Mr. Chairman.

First let me compliment you for scheduling these hearings, and I join with you in welcoming our distinguished witnesses.

SCIENCE AND RESEARCH VITAL TO COUNTRY

Support for science and research, and successful science and research, in our country is absolutely vital. It is vital to our national economy, and I might just add as an aside—obviously, the gentlemen there know it—it is very vital to my State, New Mexico. We have been very privileged to have a great deal of science activity as a result of the national labs and some of the SDI work and some other things.

The massive Federal budget, as I see it, has to do three things. It has to spend for today's problems; it has to spend to meet prior commitments; and I think the place we have been lacking is it has to spend to meet some of tomorrow's challenges. And the world is moving so fast that that one is more and more imminent, Mr. Chairman, and more and more difficult.

In confronting the problems of today and the commitments of the past, we cannot short-change the future. A couple of weeks ago, we discussed one of the key elements in our search for excellence when we considered our budget recommendations on education. Today, we are discussing a special aspect—spending on research and development. And obviously this is not all a government function. Well over half the research in the country is done by the private sector. But clearly, we have to strive to fund those programs that cause that synergism to occur where we get more out of the Federal research by far than we put in, because it is used in a synergistic way in the marketplace.

That is a difficult challenge—how do we better transfer technology; how do we better use the private sector in a match-up with the government scientists and institutions; what new things should we be trying in these areas; what role should the National Science Foundation play in this kind of activity.

I think some of you at the table there know that my State has tried some innovative things in all of these areas. New models to try to effect change and effectiveness are clearly the order of the day.

PRESIDENT ASKS FOR INCREASES

I am very pleased that the President in this part of his budget is asking for significant increases if by this part of the budget we mean the conventional institutions such as NSF, where significant increases have been asked for.

In his budget message, there is not new money, at least not substantial new money, in some of the areas that are spoken of in his competitiveness message. I hope we can find a way to implement those.

There is no doubt in my mind that we have to find a better way to stay on the cutting edge in science, in math, in physics and in applied technology. Excellence does not come cheap; on the other hand, we have difficult ways here in the Congress and as a nation, because of precedent and the like. I hope we will find that we can break those shackles and get on with some real stimulating activities in the fields of math, science, technology.

Mr. Chairman, I look forward to our witnesses' testimony.

Thank you.

Chairman CHILES. Thank you, Senator Domenici.

Senator Lautenberg?

OPENING STATEMENT OF SENATOR LAUTENBERG

Senator LAUTENBERG. Yes; Mr. Chairman. Despite the practice of not making opening statements, I did ask the privilege of making a short statement, because I have an opportunity to welcome the distinguished leader of a wonderful research company from New Jersey.

I want to welcome Dr. Ian Ross to the committee. Bell Labs, the company he heads, has been a national resource, and it is a source of pride for all of us in New Jersey.

I visited the Labs, and it is an impressive place, with an impressive staff, and I want to publicly compliment Dr. Ross because he managed this company through some turbulent times, as we saw a change in the character of AT&T, the parent company, and its changing structure. I want to compliment him because he has held together an excellent staff, and they have continued to be a source of creativity and innovation.

We need to make sure that their kind of work continues, and how we do it is one of the questions that I hope we are going to explore today.

EDGE BEING CHOPPED AWAY

Mr. Chairman, our budget is a statement of priorities, and one major priority should be the advancement of American science and technology. That is our edge. But that edge is being chopped away by competition from abroad and dulled by neglect at home. These are disturbing signs.

Defense R&D, as we have seen here, is swamping civilian commercial R&D. Many of our best and brightest science and engineering graduates are not America's best and brightest, but are from other countries—Taiwan, Japan, India—and they make an important and welcome contribution. But we need to encourage more of our kids to get into science and to stimulate their interest in the science and research fields.

We need to do more to teach our youngsters math and science and computer science. We do not do enough to protect our innovations from piracy abroad, while at the same time it seems that more and more, our patent system is used for the protection of Japanese patents instead of our own.

Of course, there are signs of hope. We still have the high ground. America still leads the world. Our challenge is to make sure that we continue that leadership into the future, and I want to welcome this very distinguished panel and look forward to the testimony of each one of them.

Thank you very much, Mr. Chairman.

Chairman CHILES. Thank you, Senator.

Mr. Bloch, we are going to let you start off. I will tell each of you that your statements in full will be placed in the record.[1]

STATEMENT OF ERICH BLOCH, DIRECTOR, NATIONAL SCIENCE FOUNDATION

Mr. Bloch. Thank you, Mr. Chairman, and I want to thank you for the opportunity to provide an overview of the National Science Foundation's budget proposals for 1988 and to discuss their importance to the nation's economic competitiveness.

As you mentioned, I have a detailed statement for the record, so I will be very brief.

Before I start, however, I would like to say how much the Foundation has appreciated the support that this committee has always given to the Foundation budget requests.

MOVE ECONOMIC COMPETITIVENESS TO CENTER STAGE

It is high time that economic competitiveness move to center stage. For too long, we have tended to see the source of our economic problems as outside of ourselves—the result of unfair trade practices, or low wages in other countries, or unfavorable exchange rates.

Recently we have realized that if we want to compete successfully as a Nation, the most important thing is to stay ahead of our competitors in creating ideas through basic research, and turning them into high-quality, innovative products and services for the marketplace.

Many forces obviously must come together to guarantee our economic competitiveness. But our key assets are new knowledge and well-educated people. New knowledge through research is important because it provides the ideas for the new products that we need to compete in high-technology areas. It also contributes to the process improvements that can raise productivity in low-technology manufacturing and service industries.

Education of our people is important to competitiveness because talented and well-trained people are the source of the ideas and the knowledge that make technological innovation and a dynamic economy possible.

The Government's ability to determine our competitive position is limited. The Government clearly has the role with respect to such matters as trade, taxation and clarifying antitrust legislation, for example, with respect to joint ventures.

However, for good reasons, much of the initiative and responsibility for economic competitiveness rests with the private sector.

SUPPORT OF BASIC RESEARCH AND EDUCATION CRITICAL

But there is one area in which the government's role is both necessary and critical, and that is the support of basic research and education.

That is why the National Science Foundation plays an increasingly critical role in achieving long-term economic competitiveness.

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[1] See pp. 435, 455, and 467.

NSF does this by providing linkages among the vital elements of the research base.

NSF supports not only science, but engineering as well. NSF does not only support research, but also plays a vital role in mathematics, science and engineering education. NSF support for science and engineering research and education is not an isolated, self-contained effort. We are involving industry, universities and local institutions to develop cooperative activities and in the process leverage the taxpayers' dollars. NSF's concern is not limited to the top research universities. The Foundation is broadening its support to undergraduate institutions and under-represented groups.

Because much of this country's basic research occurs in universities and is intertwined with education, it is critical that we increase our investment in our universities and colleges. That is the central idea behind the fiscal year 1988 budget request for the National Science Foundation.

Our request for 1988 is for $1,893 billion. That is a substantial 16.7 percent above our appropriation for the current year.

INCREASES WILL DOUBLE NSF BUDGET

In addition, the administration is committed to increases at a rate that will double the NSF budget to a level of $3.2 billion by 1992. And Mr. Chairman, you talk about audacious activities; I would say that is an audacious undertaking.

These increases projected over a 5-year period establish a strong base from which to expand support for education and university basic research.

This budget request is in line with the support by the administration and Congress for basic research over the last 7 years when total Federal support for research and development has nearly doubled. The fraction of the civilian-oriented effort that is devoted to basic research has risen from about 26 percent in 1980 to about 39 percent in 1987, with strong bipartisan support.

SERIOUS PROBLEMS CONTINUE IN RESEARCH AND EDUCATION

Despite this we continue to experience serious problems with research and education. When compared with our trading partners, the United States ranks only fourth among the industrialized countries in the fraction of gross national product invested in civilian research and development.

The fraction of Federal R&D that goes to basic research and to universities has been declining as a percent of the total Federal R&D budget. And furthermore, too few of our students are choosing science and engineering careers, and too few of those who do are continuing to the Ph.D. degree.

The administration's budget for the National Science Foundation addresses these shortcomings. This budget must be considered in the light of the total Federal R&D budget, not in isolation.

Through the NSF budget, we give a greater focus to civilian research, university R&D, basic research, and science and engineering education. All of these activities contribute and are prerequisites to our economic competitiveness.

Our budget proposal for 1988 emphasizes three major themes: education and human resources; science and technology centers for economic competitiveness, and disciplinary programs and facilities.

EDUCATION AND HUMAN RESOURCES

The first theme is education and human resources. People are our most important resource, and reflecting this priority, our budget proposes a 50-percent increase for NSF's education and human resources programs. The increase will enable us to provide 200 additional graduate fellowships and 200 more Presidential Young Investigator Awards. It will also support special efforts to increase the number of women and under-represented minorities in science and engineering—not just for reasons of equity—but because we cannot afford to waste their talent.

The number of scientists and engineers cannot be increased quickly, because their education takes many years, and it is particularly important that we identify the most promising students early and encourage them in every way possible to stay with science and engineering. How they are educated in high school and during their undergraduate years and what they are being taught,is a concern of NSF.

SCIENCE AND TECHNOLOGY CENTERS

The second theme is support for science and technology centers, which will receive a 48-percent increase. This would include additional engineering research centers, biotechnology centers, centers for material science, social and behavioral science centers, and computer and information science centers. These are university-based, multidisciplinary research centers, each with strong industry involvement, working on problems that are scientifically important and relevant to economic competitiveness.

This is a program that the President introduced last week in his State of the Union Message. The close coupling of industry with academic research that these centers will provide will substantially improve technology transfer from research labs to factories and to the marketplace.

DISCIPLINARY PROGRAMS AND FACILITIES

The third theme of this budget is the steady improvement in the Foundation's broad support for disciplinary programs and associated research facilities. We are proposing a 10-percent increase with special focus on global geosciences, biotechnology, material science, and engineering. This is important because by its nature, basic research is unpredictable; one cannot say in advance when and where breakthroughs with major economic importance will occur.

Mr. Chairman, our budget request for fiscal year 1988 and the 5-year strategy for the Foundation of doubling its budget will allow the Foundation to improve research and education in our universities and colleges in very important ways. It will support science and technology centers; it will increase the participation of women and under-represented minorities and institutions; it will encourage cooperation between Government, industry and universities;

and it will promote a more effective transfer of research results from universities to industry.

All these programs are important for the long-term economic health of our Nation, and I look forward to working with you and with the entire Congress to make sure that these proposals become reality.

That concludes my opening remarks. Thank you.

Chairman CHILES. Thank you, Mr. Bloch.

[The prepared statement of Mr. Bloch follows:]

TESTIMONY OF

MR. ERICH BLOCH

DIRECTOR, NATIONAL SCIENCE FOUNDATION

BEFORE THE

COMMITTEE ON BUDGET

UNITED STATES SENATE

WEDNESDAY, FEBRUARY 4, 1987

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

GOOD MORNING. I AM GLAD TO HAVE THE OPPORTUNITY TO PROVIDE AN OVERVIEW OF THE NATIONAL SCIENCE FOUNDATION'S BUDGET PROPOSALS FOR 1988 AND TO DISCUSS THEIR RELATION TO THE NATION'S ECONOMIC COMPETITIVENESS.

I WOULD LIKE TO START BY SAYING HOW MUCH THE FOUNDATION AND THE ACADEMIC SCIENCE AND ENGINEERING COMMUNITY HAS APPRECIATED THE SUPPORT THAT THIS COMMITTEE HAS SHOWN IN RECENT YEARS. AS THE ADMINISTRATION HAS SOUGHT TO SHIFT THE NATION'S ATTENTION TO THE ISSUE OF ECONOMIC COMPETITIVENESS, THIS COMMITTEE HAS BEEN AMONG THE FIRST TO UNDERSTAND THE IMPORTANCE OF BASIC SCIENCE AND ENGINEERING AND TO MAKE THE NECESSARY INVESTMENTS.

IT IS HIGH TIME THAT ECONOMIC COMPETITIVENESS MOVE TO CENTER STAGE. FOR TOO LONG WE HAVE TENDED TO SEE THE SOURCE OF OUR ECONOMIC PROBLEMS AS OUTSIDE OF OURSELVES: THE RESULT OF UNFAIR TRADE PRACTICES, OR LOW WAGES IN OTHER COUNTRIES, OR UNFAIR EXCHANGE RATES.

RECENTLY WE HAVE REALIZED, AS A NATION, THAT IF WE WANT TO COMPETE SUCCESSFULLY, THE MOST IMPORTANT THING IS SIMPLY TO STAY AHEAD OF OUR COMPETITORS IN CREATING IDEAS THROUGH BASIC RESEARCH, AND TURNING THEM INTO HIGH QUALITY, INNOVATIVE PRODUCTS AND SERVICES FOR THE MARKET PLACE.

MANY FORCES MUST COME TOGETHER TO ACHIEVE ECONOMIC COMPETITIVENESS. BUT OUR KEY ASSETS ARE NEW KNOWLEDGE AND WELL EDUCATED PEOPLE.

WHY IS RESEARCH IMPORTANT?

- RESEARCH IS IMPORTANT TO COMPETITIVENESS BECAUSE, OVER THE LONG TERM, IT PROVIDES IDEAS AND NEW KNOWLEDGE FOR THE PRODUCTS THAT WE NEED TO COMPETE IN HIGH-TECHNOLOGY AREAS, AND THE PROCESS IMPROVEMENTS THAT CAN RAISE PRODUCTIVITY IN LOW-TECHNOLOGY MANUFACTURING AND SERVICE INDUSTRIES.
- IN QUANTITATIVE TERMS, TECHNOLOGICAL INNOVATION CREATED THROUGH RESEARCH HAS BEEN RESPONSIBLE FOR NEARLY HALF OF ALL PRODUCTIVITY GAINS SINCE WORLD WAR II. RESEARCH HAS BEEN FAR MORE IMPORTANT THAN ECONOMIES OF SCALE, FOR EXAMPLE.
- MANY OF NSF'S PROGRAMS SUPPORT THIS PROCESS OF INNOVATION: ROBOTICS, ENGINEERING RESEARCH CENTERS, BIOTECHNOLOGY, MATERIALS RESEARCH, EDUCATION OF FUTURE SCIENTISTS AND ENGINEERS, AND MANY MORE.
- SEEKING PRODUCTIVITY THROUGH RESEARCH AND TECHNOLOGICAL INNOVATION IS THE RIGHT WAY TO ENHANCE INTERNATIONAL COMPETITIVENESS. IT IS FAR PREFERABLE TO RELIANCE ON TRADE BARRIERS OR OTHER PROTECTIONIST MEASURES.

WHY IS EDUCATION IMPORTANT?

THE SCIENCE AND ENGINEERING BASE ON WHICH WE DEPEND CONSISTS OF THREE ELEMENTS: PEOPLE, FACILITIES, AND EQUIPMENT.

OF THE THREE, PEOPLE ARE BY FAR THE MOST IMPORTANT. WELL TRAINED PEOPLE ARE THE SOURCE OF THE IDEAS AND THE KNOWLEDGE WHICH MAKE TECHNOLOGICAL INNOVATION POSSIBLE. A DYNAMIC, PRODUCTIVE ECONOMY DEPENDS ON A STEADY FLOW OF NEW IDEAS, AND A STEADY FLOW OF WELL-EDUCATED PEOPLE TO TURN THEM INTO SUCCESSFUL PRODUCTS.

FACILITIES AND EQUIPMENT CAN BE HAD RELATIVELY QUICKLY -- IT ONLY TAKES ENOUGH MONEY. PEOPLE, HOWEVER, COME ONLY THROUGH A LONG PROCESS OF EDUCATION. FOR A SCIENTIST OR ENGINEER, THE PROCESS BEGINS IN JUNIOR HIGH SCHOOL AND CONTINUES THROUGH UNDERGRADUATE AND GRADUATE TRAINING: IN ALL, A DOZEN YEARS OR MORE.

THE LENGTH OF TIME THIS REQUIRES MAKES IT IMPERATIVE THAT WE HAVE A CONTINUOUS FLOW OF THE MOST TALENTED YOUNG STUDENTS INTO SCIENCE AND ENGINEERING PROGRAMS.

THIS MUST BE DONE THROUGH CONSCIOUS POLICY. WE CANNOT DEPEND ON MARKET DEMAND TO ENSURE THAT WE HAVE THE NECESSARY NUMBERS, FOR THE MARKET FLUCTUATES MUCH TOO RAPIDLY. THE EDUCATIONAL SYSTEM CANNOT RESPOND RAPIDLY WHEN DEMAND GOES UP, AND FINDS ITSELF PRODUCING SURPLUSES WHEN DEMAND IS DOWN. THAT IS WHY IT IS SO IMPORTANT TO INCREASE OUR INVESTMENT IN UNIVERSITIES.

THE GOVERNMENT'S ABILITY TO AFFECT OUR COMPETITIVE POSITION IS LIMITED. GOVERNMENT CLEARLY HAS A ROLE WITH RESPECT TO SUCH MATTERS AS TAXATION AND THE CLARIFICATION OF ANTITRUST LEGISLATION WITH RESPECT TO JOINT VENTURES. BUT FOR GOOD REASONS MUCH OF THE INITIATIVE AND RESPONSIBILITY RESTS WITH THE PRIVATE SECTOR. THERE IS ONE AREA, HOWEVER, IN WHICH THE GOVERNMENT'S ROLE IS BOTH NECESSARY AND CLEARLY BENEFICIAL: THE SUPPORT OF BASIC RESEARCH AND EDUCATION.

THAT IS WHY THE NATIONAL SCIENCE FOUNDATION PLAYS A INCREASINGLY CRITICAL ROLE IN ACHIEVING LONG TERM ECONOMIC COMPETITIVENESS. NSF DOES THIS BY PROVIDING LINKAGES AMONG THE VITAL ELEMENTS OF THE RESEARCH BASE.

NSF SUPPORTS ALL AREAS OF SCIENCE AND ENGINEERING IN AN COORDINATED WAY. BY CONCENTRATING ON SUPPORT FOR UNIVERSITIES, IT ALSO INTEGRATES RESEARCH AND EDUCATION. THIS IS A MAJOR STRENGTH OF THE AMERICAN SYSTEM OF RESEARCH UNIVERSITIES.

NSF HAS BEEN A LEADER IN FINDING WAYS TO LINK RESEARCH IN INDUSTRY WITH UNIVERSITY PROGRAMS, SO THAT THE STRENGTHS OF EACH CAN REINFORCE THE OTHER. NSF ACTIVELY REACHES OUT TO INDUSTRIES, UNIVERSITIES, AND LOCAL INSTITUTIONS TO DEVELOP COOPERATIVE ACTIVITIES AND LEVERAGE THE TAXPAYER'S DOLLAR.

NSF IS ALSO CONCERNED WITH DEVELOPING INSITUTIONS AND REGIONS, AND WITH BROADENING THE PARTICPATION OF MINORITIES AND WOMEN, BECAUSE WE NEED THESE RESOURCES FOR THE HEALTH OF OUR SYSTEM IN THE LONG TERM.

OUR BUDGET REQUEST FOR FISCAL 1988 IS $1.893 BILLION. THAT IS A SUBSTANTIAL 16.7% ABOVE OUR APPROPRIATION FOR THE CURRENT YEAR. OF EQUAL IMPORTANCE, THE ADMINISTRATION IS COMMITTED TO INCREASES AT A RATE THAT WILL DOUBLE OUR BUDGET, TO A LEVEL OF 3.2 BILLION DOLLARS, BY 1992.

THESE INCREASES, PROJECTED OVER A FIVE YEAR PERIOD, ESTABLISH A STRONG BASE FROM WHICH TO EXPAND SUPPORT FOR EDUCATION AND UNIVERSITY BASIC RESEARCH AND PLAN FOR THE FUTURE.

THIS WATERSHED BUDGET REQUEST IS IN LINE WITH THE RISING SUPPORT BY THE ADMINISTRATION AND CONGRESS FOR BASIC RESEARCH OVER THE LAST SEVEN YEARS.

SINCE 1980, THE ADMINISTRATION HAS NEARLY DOUBLED TOTAL FEDERAL SUPPORT FOR RESEARCH AND DEVELOPMENT, FROM $33 BILLION IN 1980 TO ABOUT $63 BILLION IN 1987. THE FRACTION OF THE CIVILIAN-ORIENTED EFFORT DEVOTED TO BASIC RESEARCH HAS RISEN IN THAT TIME FROM ABOUT 26% TO ABOUT 39%.

AND WITH STRONG BI-PARTISAN SUPPORT, THE OVERALL BUDGET FOR THE FOUNDATION ROSE 66% BETWEEN 1980 AND 1987, ENDING A LONG PERIOD IN WHICH IT WAS ESSENTIALLY FLAT.

THESE ACTIONS HAVE BEEN CRITICAL IN HELPING TO STEM A LONG DECLINE. BUT WE ARE CONTINUING TO EXPERIENCE SERIOUS PROBLEMS WITH RESEARCH AND EDUCATION WHILE OUR TRADING PARTNERS ARE INCREASING THEIR INVESTMENTS IN R&D AND IN THE PRODUCTION OF SCIENCE AND ENGINEERING PERSONNEL.

AS OUR SOCIETY BECOMES MORE AND MORE DEPENDENT ON TECHNOLOGY, WE MUST BE SURE THAT WE DO THREE THINGS:

- SUPPORT BASIC RESEARCH ADEQUATELY;
- EDUCATE ENOUGH NEW SCIENTISTS AND ENGINEERS;
- INVEST SUFFICIENTLY IN RESEARCH FACILITIES AND EQUIPMENT.

SUPPORT FOR BASIC RESEARCH:

CHART 1: THE ADMINSTRATION HAS MOVED STRONGLY TO REVERSE THE DECLINES OF THE LAST TWENTY YEARS IN INVESTMENT IN BASIC RESEARCH. HIGH LEVELS OF SUCH INVESTMENT ARE NECESSARY FOR SUSTAINED GROWTH IN A MODERN TECHNOLOGICAL SOCIETY.

CHART 2: HOWEVER, OUR RATE OF INVESTMENT IN CIVILIAN-ORIENTED R&D SHOULD BE FURTHER INCREASED.

CHART 3: WE SHOULD STRIVE TO REMAIN AHEAD OF OUR MAJOR COMPETITORS IN CIVILIAN R&D -- ESPECIALLY JAPAN AND WEST GERMANY.

CHART 4: THE PROPORTIONAL SHARE OF FEDERAL SUPPORT GOING TO THE UNIVERSITIES SHOULD BE INCREASED.

CHART 5: AN ENCOURAGING TREND IS THAT OUR FEDERAL EXPENDITURES FOR DOMESTIC R&D ARE INCREASINGLY FOR BASIC RESEARCH. DEVELOPMENT EXPENDITURES ARE, QUITE PROPERLY, BEING LEFT TO INDUSTRY.

IS THERE AN OPTIMUM LEVEL OF SUPPORT FOR BASIC RESEARCH?

THERE IS NO SIMPLE ANSWER TO THAT QUESTION. BUT WHEN:

- O BASIC RESEARCH IS DROPPING AS A PROPORTION OF TOTAL FEDERAL SUPPORT; AND
- O WE SEE INCREASING COMPETITITON FROM OUR TRADING PARTNERS; AND
- O WE SEE SHORTAGES OF SCIENTISTS AND ENGINEERS DEVELOPING IN SOME FIELDS; AND
- O FACILITIES AND INSTRUMENTATION IN UNIVERSITIES NEED MODERNIZING;

THEN WE CAN ONLY CONCLUDE THAT A SIGNIFICANT INCREASE IN BASIC RESEARCH SUPPORT IN THE UNIVERSITIES IS NEEDED. THAT NEED IS RECOGNIZED IN THE ADMINSTRATION'S PROPOSAL TO DOUBLE SUPPORT FOR THE UNIVERSITIES THROUGH THE NSF OVER THE NEXT FIVE YEARS.

THE PEOPLE PROBLEM:

AS SOCIETY BECOMES MORE DEPENDENT ON TECHNOLOGY, A LARGER FRACTION OF OUR POPULATION MUST BE EDUCATED IN SCIENCE AND ENGINEERING. HOWEVER, THIS FRACTION IS DECLINING: WE ARE ATTRACTING TOO FEW YOUNG PEOPLE TO THESE AREAS.

CHART 6: TWENTY YEARS AGO, THE UNITED STATES HAD FAR MORE SCIENTISTS AND ENGINEERS PER CAPITA THAN ANY OF OUR COMPETITORS. TODAY THAT IS NO LONGER THE CASE.

CHART 7: THE PROPORTION OF OUR YOUNG PEOPLE WHO ARE BEING ATTRACTED TO SCIENTIFIC AND ENGINEERING PROGRAMS HAS REMAINED FLAT, WHEN IT SHOULD BE INCREASING.

CHART 8: EVEN IF WE COULD CONTINUE TO ATTRACT STUDENTS AT THE 1983 RATE, THE DECLINE IN THE NUMBER OF 22 YEAR OLDS MEANS THAT WE WOULD PRODUCE NEARLY 700,000 FEWER BACCALAUREATES IN THESE FIELDS IN THE NEXT TWENTY YEARS.

CHART 9: OUR PHD PRODUCTION AS A PERCENT OF BACHELOR DEGREES IN SCIENCE AND ENGINEERING IS DECLINING. IN FACT, IN MANY IMPORTANT FIELDS, THE TOTAL YEARLY PRODUCTION OF PHD'S

IS DECLINING IN ABSOLUTE TERMS.

OUR BUDGET PROPOSALS FOR 1988 ARE FOCUSED ON DEALING WITH THESE ISSUES AND GIVING A RENEWED EMPHASIS TO BASIC RESEARCH AND SUPPORT FOR UNIVERSITIES.

THREE MAJOR THEMES ARE EMPHASIZED IN THIS BUDGET:

- EDUCATION AND HUMAN RESOURCES
- SCIENCE AND TECHNOLOGY CENTERS
- DISCIPLINARY PROGRAMS AND FACILITIES

WE ARE MAKING MAJOR EFFORTS TO CONCENTRATE OUR RESOURCES AND MAKE REAL IMPROVEMENTS IN EACH OF THESE AREAS.

EDUCATION AND HUMAN RESOURCES

THE FIRST THEME IS EDUCATION AND HUMAN RESOURCES. THE NATION'S SCIENCE AND ENGINEERING BASE -- THE SOURCE OF OUR ABILITY TO DO BASIC RESEARCH -- IS MADE UP OF PEOPLE, EQUIPMENT, AND FACILITIES.

OF THE THREE, PEOPLE ARE THE MOST IMPORTANT. REFLECTING ITS PRIORITY, OUR BUDGET PROPOSES A 50% INCREASE FOR EDUCATION AND HUMAN RESOURCES. THIS WILL SUPPORT 200 ADDITIONAL GRADUATE FELLOWSHIPS, INCREASE THE NUMBER OF PRESIDENTIAL YOUNG INVESTITGATORS BY 200, AND SUPPORT SPECIAL EFFORTS TO INCREASE THE NUMBER OF WOMEN AND UNDERREPRESENTED MINORITIES.

THE NUMBER OF SCIENTISTS AND ENGINEERS CANNOT BE INCREASED QUICKLY, BECAUSE THEIR EDUCATION TAKES MANY YEARS. IT IS PARTICULARLY IMPORTANT THAT WE IDENTIFY THE MOST PROMISING STUDENTS EARLY, AND ENCOURAGE THEM IN EVERY WAY POSSIBLE TO STAY WITH SCIENCE AND ENGINEERING.

WE MUST ALSO INTENSIFY OUR EFFORTS TO RECRUIT MORE WOMEN AND MINORITY STUDENTS TO THESE FIELDS. THIS IS NOT ONLY A MATTER OF EQUITY: WE SIMPLY CANNOT AFFORD TO WASTE THE TALENTS THESE PEOPLE HAVE.

SCIENCE AND TECHNOLOGY CENTERS:

THE SECOND THEME IS THE ESTABLISHMENT OF SCIENCE AND TECHNOLOGY CENTERS. THESE ARE UNIVERSITY-BASED, MULTIDISCIPLINARY RESEARCH CENTERS, EACH WITH STRONG INDUSTRY INVOLVEMENT, WORKING ON PROBLEMS THAT ARE SCIENTIFICALLY IMPORTANT AND RELEVANT TO INDUSTRIAL TECHNOLOGY. THIS IS THE PROGRAM THAT THE PRESIDENT

ANNOUNCED LAST WEEK IN HIS STATE OF THE UNION ADDRESS.

THE CLOSE COUPLING OF INDUSTRY WITH ACADEMIC RESEARCH THAT THESE CENTERS PROVIDE WILL SUBSTANTIALLY IMPROVE TECHNOLOGY TRANSFER FROM RESEARCH LABS TO FACTORIES AND TO THE MARKETPLACE.

AT THE SAME TIME, SCIENCE AND TECHNOLOGY CENTERS PLAY A PART IN THE EDUCATION PROCESS BECAUSE THEY INVOLVE GRADUATE STUDENTS, AND EVEN SOME UNDERGRADUATES, IN RESEARCH ON IMPORTANT PROBLEMS. THE RESULT OF THAT RESEARCH WILL FIND ITS WAY INTO IMPROVED CURRICULA.

THE PROPOSED 18% INCREASE WILL BE APPLIED TO THE ESTABLISHMENT NEW CENTERS BASED ON THE PROVEN CONCEPT OF THE ENGINEERING RESERACH CENTERS. THESE WOULD INCLUDE ADDITIONAL ERC'S, BIOTECHNOLOGY CENTERS, AS WELL AS CENTERS FOR MATERIALS SCIENCE, SOCIAL AND BEHAVIORAL SCIENCES,, AND COMPUTER AND INFORMATION SCIENCES.

DISCIPLINARY RESEARCH:

THE THIRD THEME OF THIS BUDGET IS THE STEADY IMPROVEMENT OF THE FOUNDATION'S TRADITIONAL BROAD SUPPORT FOR DISCIPLINARY PROGRAMS AND SPECIALIZED RESEARCH FACILITIES, FOR WHICH WE ARE PROPOSING AN INCREASE OF 10% WITH SPECIAL FOCUS ON GLOBAL GEOSCIENCES, BIOTECHNOLOGY, MATERIALS SCIENCE AND ENGINEERING, AND THE CONTINENTAL LITHOSPHERE PROGRAM.

SOLID SUPPORT ACCROSS ALL THE DISCIPLINES IS IMPORTANT BECAUSE, BY ITS NATURE, BASIC RESEARCH IS UNPREDICTABLE; ONE CANNOT SAY IN ADVANCE WHERE A BREAKTHROUGH WITH MAJOR ECONOMIC IMPORTANCE WILL BE FOUND. BUT WE KNOW FROM EXPERIENCE THAT THEY WILL BE FOUND.

LET ME GIVE YOU AN EXAMPLE OF THAT THAT I FOUND STRIKING: A PROBLEM IN BASIC RESEARCH IN ASTRONOMY A FEW YEARS AGO WAS TO DEVELOP CALCULATIONS THAT COULD DETERMINE THE PROPERTIES OF OBJECTS THAT ARE OCCLUDED BY THE MOON. NO ONE COULD HAVE PREDICTED THAT THIS SAME PROCESS OF CALCULATION WOULD BECOME THE BASIS OF AN IMPORTANT MODERN MEDICAL TECHNOLOGY CALLED COMPUTERIZED AXIAL TOMOGRAPHY: THE "CAT" SCAN.

THESE JUMPS FROM BASIC RESEARCH TO APPLICATIONS CAN ALMOST NEVER BE FORESEEN, BUT THEY HAVE HAPPENED SO FREQUENTLY IN THE PAST THAT WE CAN BE CONFIDENT OF THE ULTIMATE VALUE OF THE INVESTMENT.

SUMMARY:

THE NSF BUDGET FOR FISCAL YEAR 1988 AND FUTURE YEARS WILL ALLOW THE FOUNDATION TO IMPROVE RESEARCH AND EDUCATION IN OUR UNIVERSITIES AND COLLEGES IN VERY IMPORTANT WAYS:

- SCIENCE AND TECHNOLOGY CENTERS;
- MATHEMATICS, SCIENCE, AND ENGINEERING EDUCATION AT ALL LEVELS OF THE EDUCATIONAL PIPELINE;
- BROADER PARTICIPATION OF INSTITUTIONS AND UNDERREPRESENTED GROUPS;
- COOPERATION BETWEEN FEDERAL AND STATE GOVERNMENTS, INDUSTRY, AND ACADEMIA; LEVERAGING TAXPAYERS' DOLLARS IN THE PROCESS;
- TRANSFER OF RESEARCH RESULTS FROM UNIVERSITIES TO INDUSTRY.

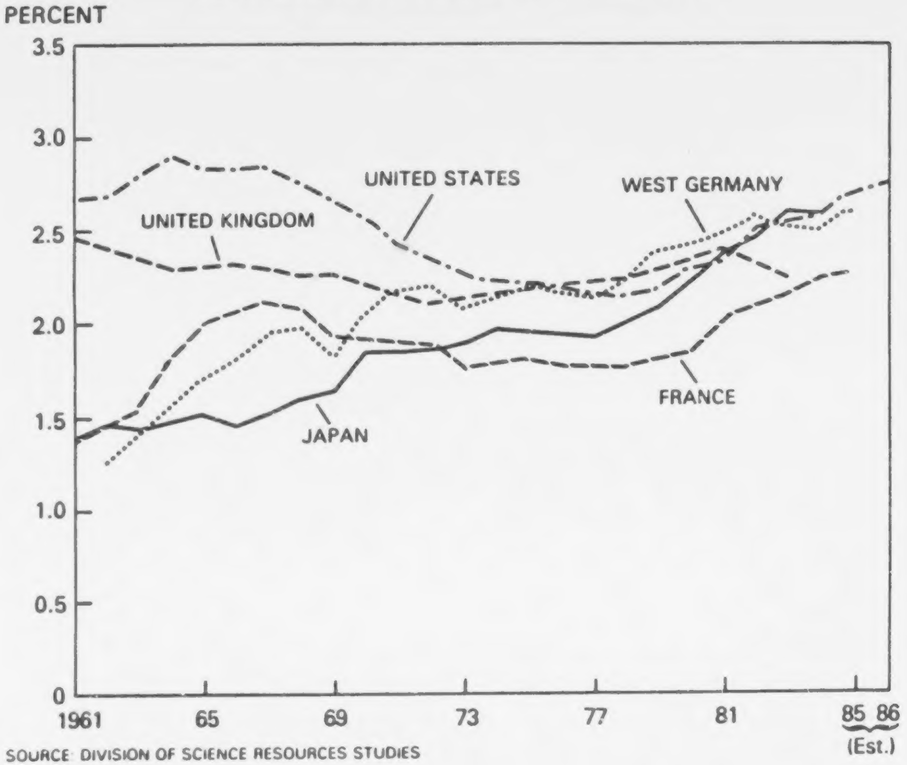
MR. CHAIRMAN, ALL THESE ACTIVITES ARE IMPORTANT FOR THE LONG TERM ECONOMIC HEALTH OF OUR NATION. THROUGHT THEM, THE FOUNDATION WILL MAKE SIGNIFICANT IMPROVEMENTS IN RESEARCH AND EDUCATION AT OUR UNIVERSITIES AND COLLEGES.

EVEN MORE IMPORTANT, THE COMMITMENT TO CONTINUED GROWTH WILL KEEP BASIC RESEARCH AND EDUCATION IN SCIENCE AND ENGINEERING ON A STEADY UPWARDS TRACK. I BELIEVE STRONGLY THAT NOTHING IS MORE IMPORTANT FOR THE LONG TERM ECONOMIC HEALTH OF OUR NATION. AND I LOOK FORWARD TO WORKING WITH YOU AND WITH THE ENTIRE CONGRESS TO MAKE SURE THAT THESE PROPOSALS ARE TURNED INTO ACTIONS.

URNED INTO ACTIONS.

THAT CONCLUDES MY TESTIMONY. I WOULD BE HAPPY TO GO INTO FURTHER DETAIL ON ANY OF THESE POINTS, OR ANSWER ANY QUESTIONS THAT YOU OR OTHER MEMBERS OF THE COMMITTEE MAY HAVE.

NATIONAL EXPENDITURES FOR PERFORMANCE OF RESEARCH AND DEVELOPMENT AS PERCENT OF GROSS NATIONAL PRODUCT BY COUNTRY

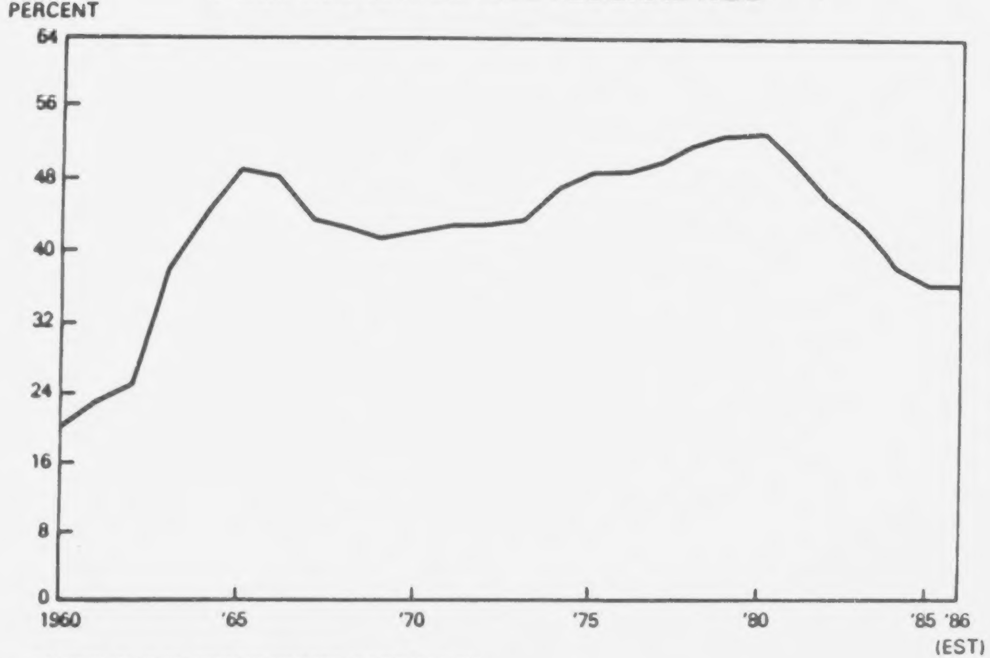


SOURCE: DIVISION OF SCIENCE RESOURCES STUDIES

70-11/86

2

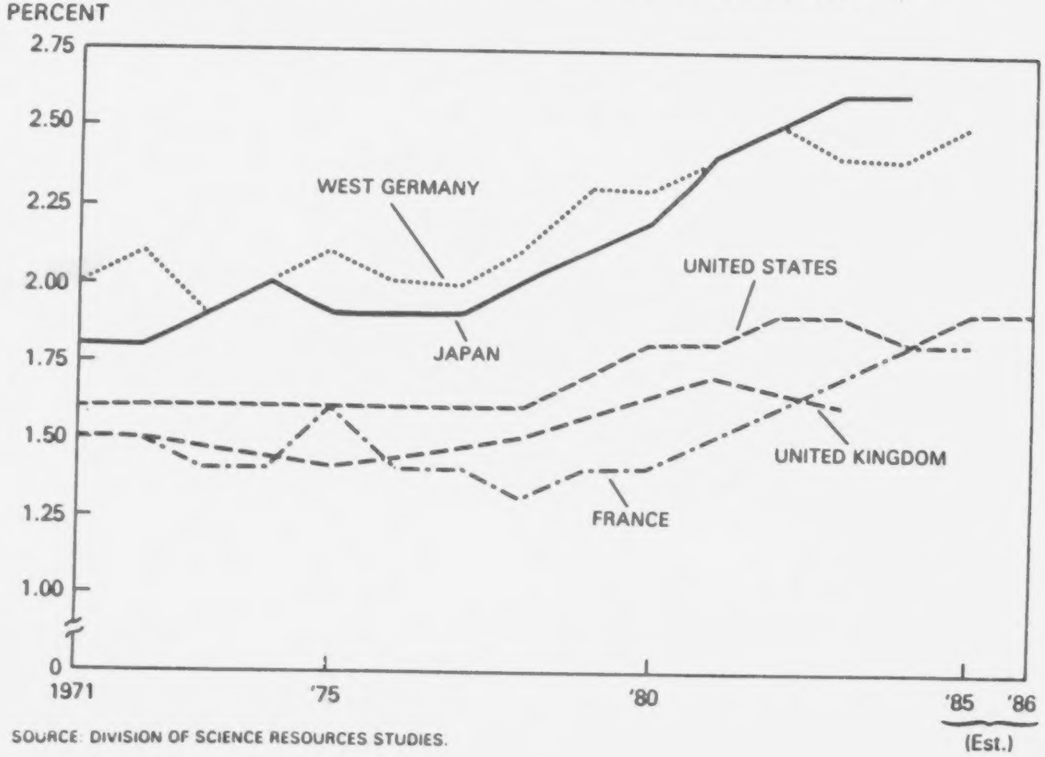
FEDERAL CIVILIAN (NON-DoD) R&D AS A PROPORTION OF ALL FEDERAL R&D



SOURCE: DIVISION OF SCIENCE RESOURCES STUDIES.

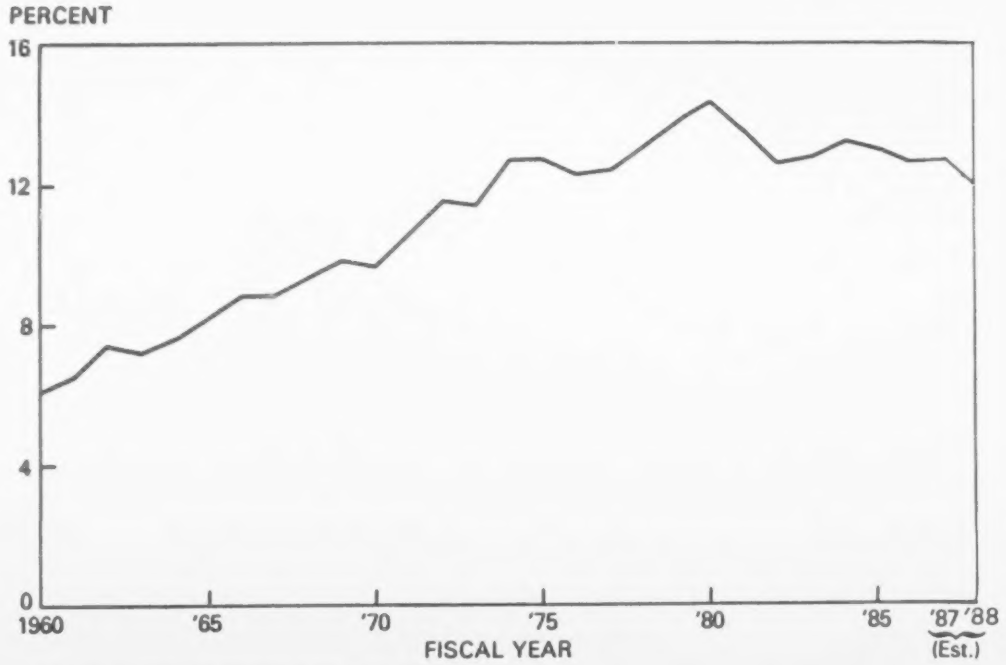
3

NON-DEFENSE R&D EXPENDITURES AS A PERCENT OF GROSS NATIONAL PRODUCT (GNP) BY COUNTRY



SOURCE: DIVISION OF SCIENCE RESOURCES STUDIES.

4

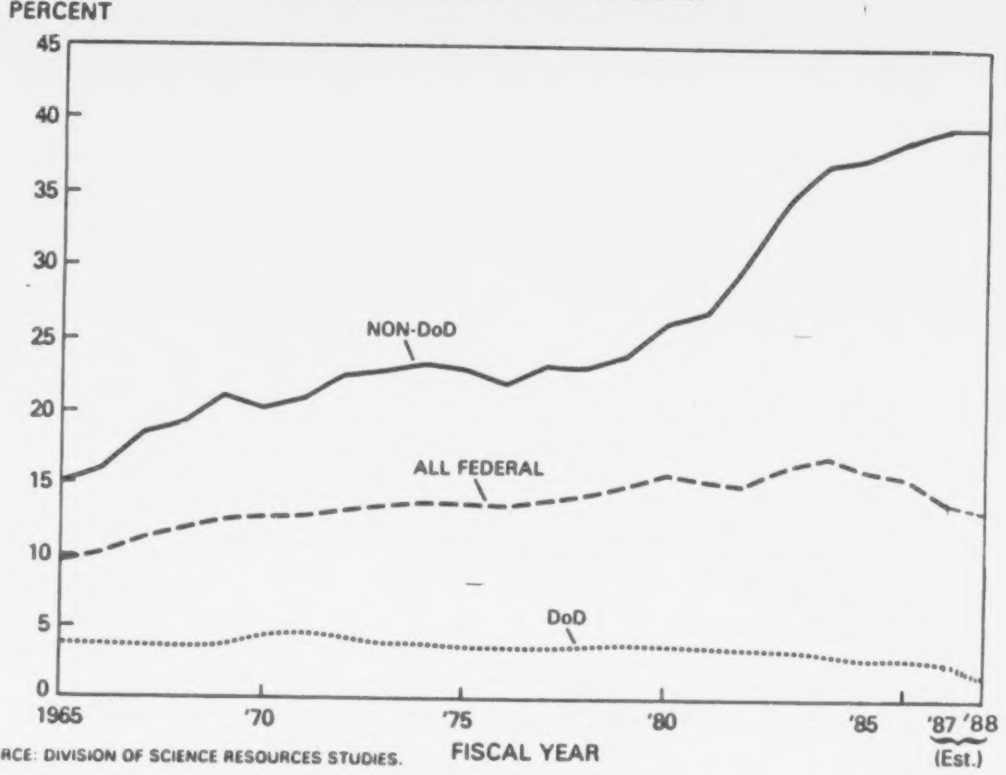


FEDERAL OBLIGATIONS FOR R&D AT UNIVERSITIES AND COLLEGES AS A PERCENTAGE OF ALL FEDERAL R&D

SOURCE: DIVISION OF SCIENCE RESOURCES STUDIES.

5

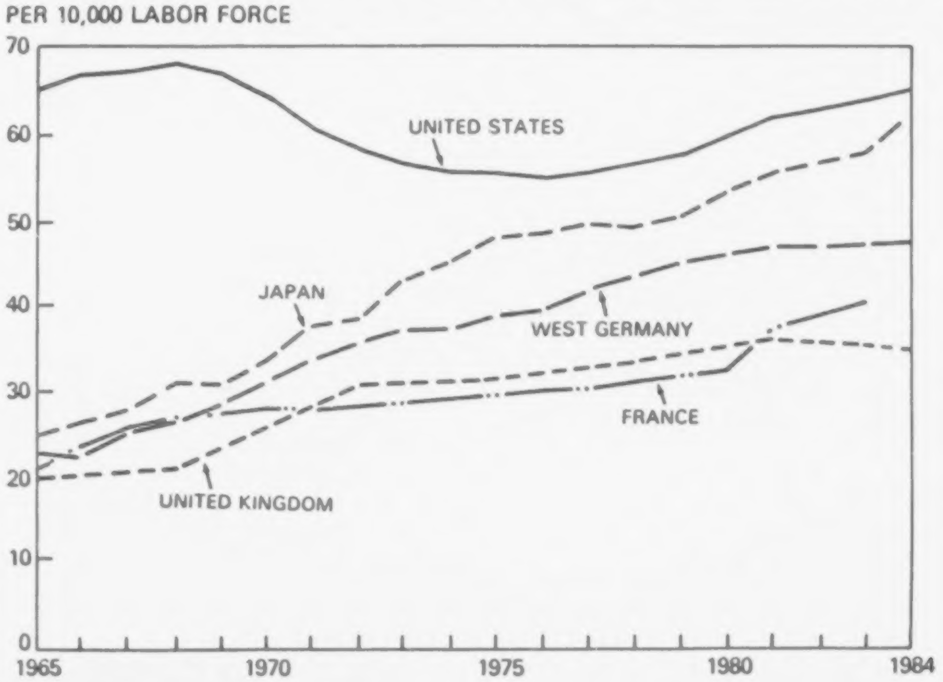
FEDERAL BASIC RESEARCH AS A PROPORTION OF TOTAL FEDERAL R&D, BY CATEGORY



SOURCE: DIVISION OF SCIENCE RESOURCES STUDIES.

12-11/86

SCIENTISTS & ENGINEERS ENGAGED IN RESEARCH & DEVELOPMENT PER 10,000 LABOR FORCE POPULATION BY COUNTRY



SOURCE: DIVISION OF SCIENCE RESOURCES STUDIES.

143-10/86

49-11/86

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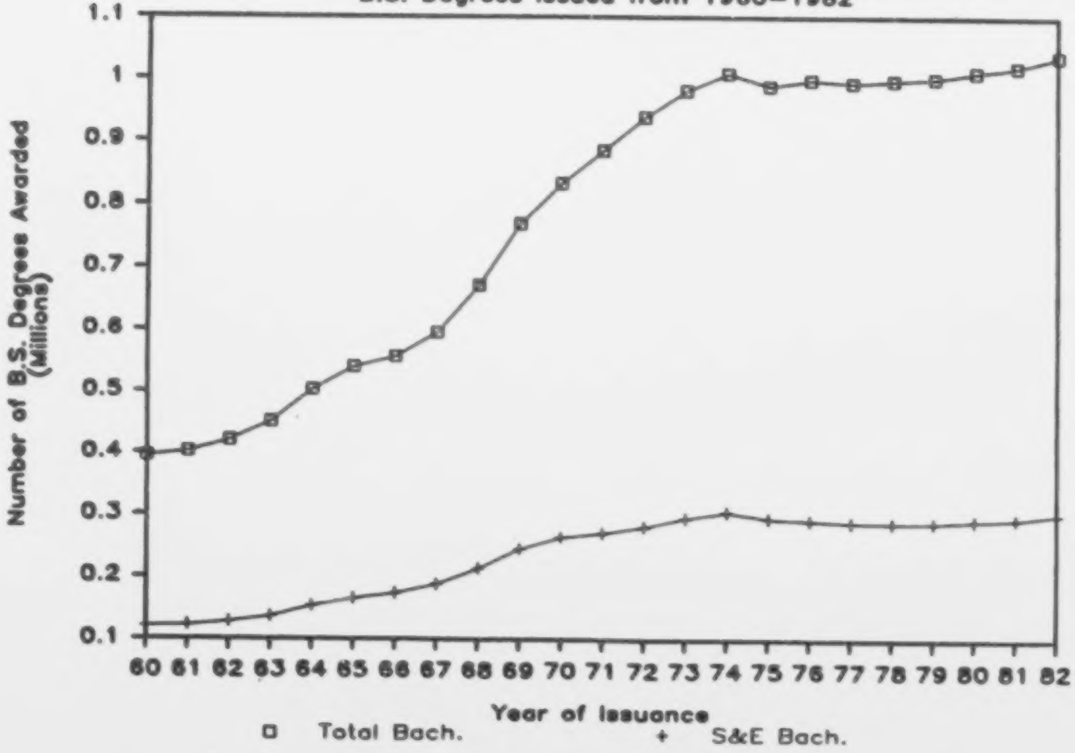
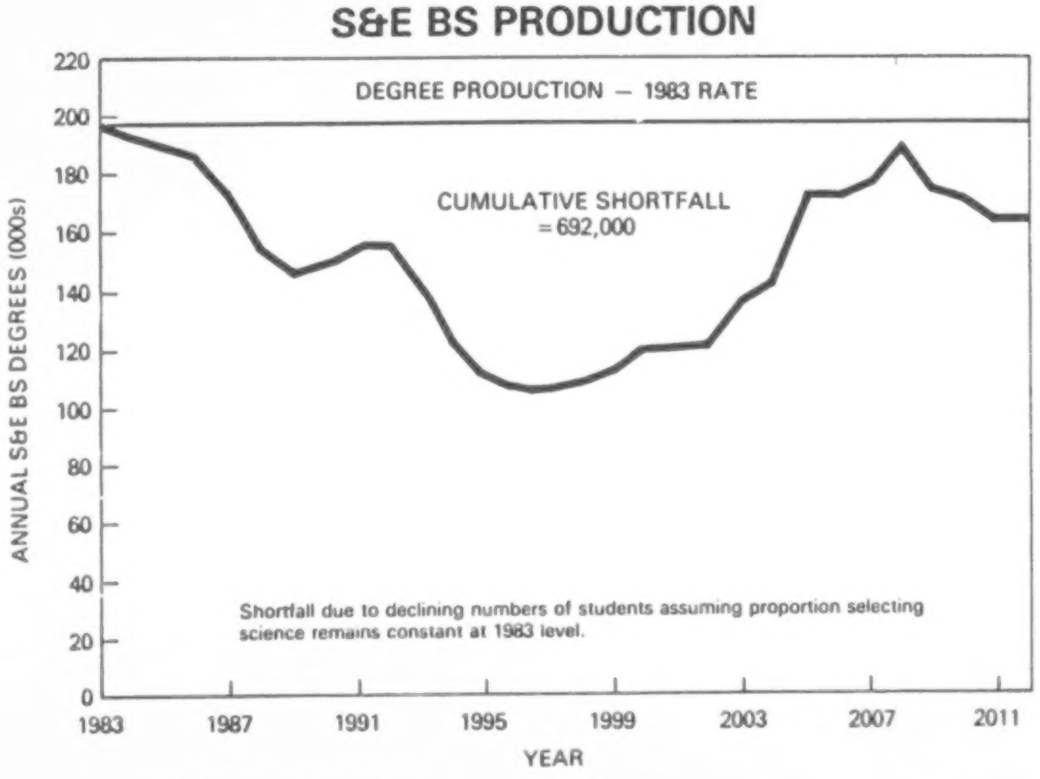


Comparison of Total and S&E

B.S. Degrees Issued from 1960–1982



S&E BS PRODUCTION

DEGREE PRODUCTION — 1983 RATE

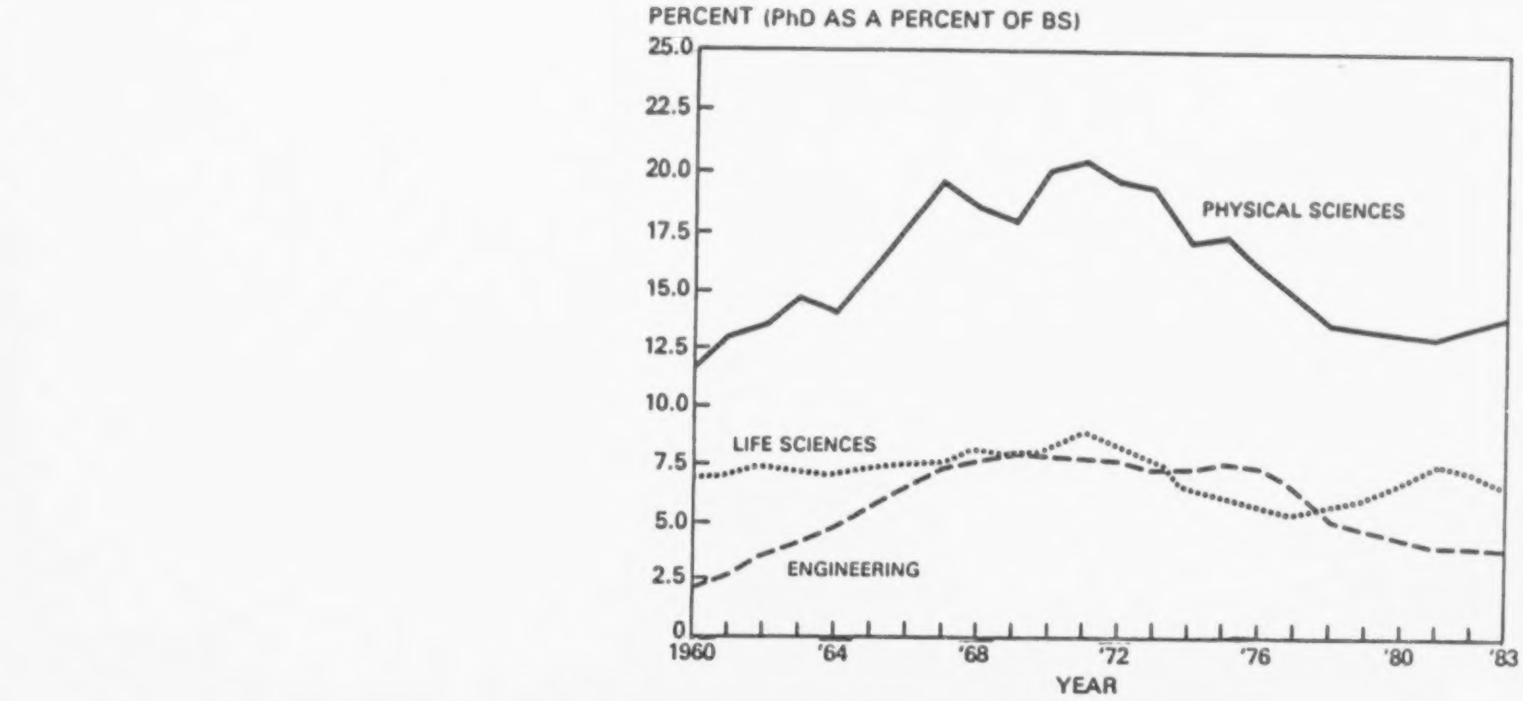
CUMULATIVE SHORTFALL
= 692,000

Shortfall due to declining numbers of students assuming proportion selecting science remains constant at 1983 level.

Source: National Science Foundation, based on Census data.

139-9/86

PhD DEGREES COMPARED TO BS DEGREES
BY DISCIPLINE



SOURCE: NATIONAL SCIENCE FOUNDATION, NATIONAL RESEARCH COUNCIL AND CENTER FOR EDUCATION STATISTICS.

118-9/86

Chairman CHILES. Dr. Trivelpiece?

STATEMENT OF DR. ALVIN W. TRIVELPIECE, DIRECTOR, OFFICE OF ENERGY AND RESEARCH, U.S. DEPARTMENT OF ENERGY

Dr. TRIVELPIECE. Thank you, Mr. Chairman, members of the committee. It is a pleasure to be here.

The trouble with following Erich on the program is that he uses up all the good ideas and leaves the rest of us nothing really good to say.

I certainly support all the things that Erich said with regard to the benefits of research and so on. I would like to alter my remarks now that I have heard what he had to say.

COMPETITORS ARE TRYING HARDER

You mentioned competitiveness in the opening. That certainly has become a buzzword of the year. It presents some difficulty because it is not exactly a precise term. Nobody is quite sure what it means. But it is pretty clear in looking at the balance of trade deficit that somebody out there is competing better than they used to and that we are finding ourselves with a problem. It may be that the other fellow is just trying a little harder and doing better in trying to get along in the world himself.

This has created a lot of concern on what to do and how to do it and who should do it, and many people have made suggestions.

Well, you know, part of it must be the cost of money. That has got to factor into this. And certainly, part of it has got to be the price of labor. Part of it has to be the traditional basis by which we go about doing things that is different from the way other people do things.

BASIC SCIENTIFIC RESEARCH CORNERSTONE OF ECONOMY

But I believe it is true, as Erich has said, that basic scientific research is really one of the true cornerstones of our economy. And it is a proper function of government. It is the thing that government should do and should support and should support properly.

Basic research is very difficult for corporations to do, and I am sure Dr. Ross knows this, that his corporation is one of the few that really has been outstanding in terms of support of truly basic research over a long period of time. Such research does provide the new knowledge and the new trained scientists that we need.

A rough estimate—just a very rough, back-of-the-envelope estimate, and I would not try to defend it in front of anyone—but here we are on the 90th anniversary of the discovery of the electron by J.J. Thompson. And if you ask what is the present gross national product of the United States, and what fraction of that is due to our knowledge of the atom and its sub-atomic parts, you can come up with a number of around one-third. That is rather remarkable—in other words, that 90 years ago we discovered the electron; in the 1930s, we discovered the neutron and other sub-atomic parts, and from that has flowed nuclear power, nuclear medicine and things like that.

So a whole third of our GNP owes its existence to that kind of knowledge. Well, certainly the taxes that are paid on that return a great deal to the Federal Treasury, and I suspect it is a bit more than that which we are actually spending on research now, which may be the investment that we need to be making into the future.

The Department of Energy labs, of course, have played an important role in this, that some of their laboratories are as old as 50 years. Obviously, they began with the AEC and continued through ERDA and they are present today.

Some of these programs include basic energy sciences and high-energy physics and nuclear medicine. The Department of Energy at present probably spends about $1 billion in the university enterprise. Something in excess of 5,000 students per year receive their support for advanced degree training.

DOE HELPING TO TRAIN STUDENTS

And recently, the Department of Energy has also taken up the idea of using its laboratories to help train students in science, and so some of the science center types of things that are being done by the National Science Foundation will also be done at DOE laboratories. We have a laboratory cooperatives program where undergraduate students spend their time at DOE laboratories. We are going to expand that in this year's budget into a year-around program.

With Secretary Harrington's help a couple of years ago, we started a program to have the brightest students in mathematics and physics and other subjects like that from each State spend a week or 2 weeks at one of our national laboratories. The first program, of the 52 students who went to Livermore, 18 of them have now returned and are now working at the Livermore national laboratory.

TECHNOLOGY TRANSFER

One of the things I would like to do also is to introduce an idea which is that technology transfer is a very commonly used term. It creates an impression that there are things in catalogs, waiting on the shelf to be taken up by industry and manufactured in a way that will provide immediate competitive opportunities.

Abdul Salaam, who is the Nobel Prize-winning Director of the Institute for Theoretical Physics at Trieste a couple of years ago, in an article in the Surin Courier, said that what we are really talking about is science transfer, not technology transfer. It is the ideas, what is available in universities, laboratories and so on, the ideas in science. They are not finished products waiting to be manufactured. To that extent, technology transfer takes place best when one human being goes from one place to another.

With Mr. Domenici's help a couple of years ago, we got a program started which permits DOE laboratory scientists to go to industry and industrial scientists to come to DOE laboratories. I think those kinds of programs need to be expanded. You referred to the President's Competitiveness Program, and it contains a section devoted particularly to that subject. I hope that is something that we can do, with your help.

There are many DOE user facilities which are used by a number of scientists, and I would like to offer this book, which describes it, to the committee.[1] Also with respect to the DOE Universities Programs, there is a similar type of document we had prepared recently, and with your permission, I would like to offer that to the committee.[2]

DOE USER FACILITIES NOT BEING UTILIZED

One of the things about the DOE user facilities that I wanted to mention is that there are scientists from other countries using them. While I do not think there is anything wrong with that, what troubles me is that there are not as many scientists from the United States using them as there should be. So when I visit our laboratories, I would like to see more corporate scientists from U.S. corporations there, taking advantage of the facilities that have been made with taxpayers' money.

This is an area, as Erich Bloch has said, where there has been good congressional support. The Congress and the administration agree on basic research. Bipartisan support has been absolutely spectacular. I hope it continues.

Thank you, Mr. Chairman. I would be happy to answer any questions.

Chairman CHILES. Thank you very much.

[The prepared statement of Dr. Trivelpiece follows:]

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[1] "Users Guide to DOE Facilities", U.S. Department of Energy, January 1984. Retained in the files of the committee.

[2] "University Research and Scientific Education Programs of the U.S. Department of Energy," U.S. Department of Energy, September 1986. Retained in the files of the committee

Statement of Alvin W. Trivelpiece

Director

Office of Energy Research

Department of Energy

before the

Senate Budget Committee

February 4, 1987

Mr. Chairman and Members of the Committee:

I am pleased to be here today to discuss the relationship of science and technology to the United States' competitive position in the world economy. There can be little doubt that excellence in science and technology has been a major contributor to both our national security and our economic competitiveness. But science and technology are not the whole story. In addition to making "better mouse traps", we must increase our productivity and market our products more effectively than our competitors. Nevertheless, as the President's Commission on Industrial Competitiveness has emphasized, technological innovation propels our economy forward, and we owe much of our standard of living to U.S. preeminence in technology.

It is widely acknowledged that the research and development supported by both the Federal government and the private sector have been instrumental in maintaining the United States' position as a world leader in science and technology. The research and development capability of this country is still unequaled in the world. Federal support has been a critical element in the evolution of high technology industries such as computer and aircraft manufacturing in which the U.S. has maintained world leadership; however, we must take full advantage of this strength by ensuring that the fruits of our research and development are exploited by U.S. industry and turned into American-made products. We must also continue to provide strong, stable support for federally supported basic research programs, and the facilities in which they are carried out, to assure that the technology transferred to industry is forefront quality. This transfer of high quality technology is of particular importance, since federally sponsored research represents about 50 percent of all the research in this country.

In this testimony I will summarize how some of our past investments in fundamental research have led to major new industries in which the U.S. has exerted world leadership. I will also describe the steps that we have taken to couple the resources of the DOE laboratories much more closely with private industry.

Basic research programs, such as those supported by the Department of Energy, are an important first link in the chain of events from scientific discovery to economic growth through technological innovation.

Many of the most far-reaching modern innovations have their roots in efforts to understand the fundamental structure of matter. The study of atoms led to the discovery of the nucleus. Its study, in turn, led to nuclear power and nuclear medicine. Techniques developed for fundamental physics have turned out to have important practical applications with great economic value. The first lasers, 20 years or so ago, were cumbersome and had no obvious uses. Today, lasers are used in an enormous variety of practical uses, from eye surgery to high precision welding to optical communication, from supermarket checkouts to detection of atmospheric pollutants--the list is almost endless. Lasers have thus resulted in improved products, in increased productivity, and in the creation of entirely new and innovative products. Semiconductor electronics has a similar history. The quest for fundamental knowledge of solid state physics led to a host of useful inventions and new products and services.

DOE programs have contributed to broad scientific and technological developments that have led to the rise of whole new industries. The best known is the nuclear power industry. The field of nuclear medicine is another good example since a large percentage of the research in nuclear medicine has been funded by the Department and its predecessor agencies starting with the Atomic Energy Commission. Nuclear medicine has provided non-invasive methods for monitoring body functions and isolating and treating the causes of diseases in ways never before possible. The results of this research have led to widespread use of nuclear technology in clinical and laboratory medicine.

An estimated 80-100 million nuclear medicine procedures are performed annually in the U.S., and nuclear medicine has spawned industries valued at hundreds of millions of dollars a year.

Supercomputer technology is another example where the Department has made enormous contributions. The DOE laboratories at Los Alamos and Livermore pioneered computational science. They worked with computer vendors to design more powerful machines. These laboratories provided most of the market for supercomputers in the 1950's and 1960's, and they spent considerable resources developing applications codes and systems software. Today, computational science is recognized as an essential tool in many fields of science and engineering. This technology has now advanced to the point that many U.S. firms have recently installed supercomputers. I believe this is one of the keys to both the military and economic security of this country.

These examples of nuclear power, nuclear medicine, and supercomputers represent broad technology areas that have been pioneered by the Department and transferred to industry. The many levels at which technology transfer occurs can be seen, for instance, in the High Energy and Nuclear Physics programs. Research in High Energy and Nuclear Physics pushes the frontiers of science in the quest for a better understanding of the constituents of matter and the forces that govern them--in other words, the world in which we live. Research aimed at answering these questions requires very large and sophisticated accelerators, detectors and other advanced equipment. Over the years, through technology transfer, the High Energy and Nuclear Physics programs have made significant contributions in the fields of energy, health, and national defense. They have also made contributions to a variety of industries including medical instrumentation, the production of nuclear energy, and many applications of electronic and computer techniques.

The examples I have just mentioned reflect technology transfer in broad areas. In fact, technology transfer frequently occurs on a smaller scale. An example of innovation at the individual level occurred recently at Brookhaven National Laboratory (BNL). Scientists there developed a device called a triple preamplifier. This device amplifies small electrical charge impulses from various types of nuclear radiation detectors. Although it was developed for physics experiments, it can be used in medical and nuclear electronics and in nuclear instrumentation for oil and gas exploration. In October 1986, BNL received a prestigious IR-100 award designating this device as one of the 100 most significant new technological products of the previous year.

Our laboratories continue to be leaders in federal innovation efforts. This year DOE laboratories were awarded 21, or one-fifth, of the IR-100 awards. These awards recognize the most significant technology products and processes with market potential. Last year the DOE laboratories also were awarded 21 citations. In fact, since 1981 DOE laboratories have accumulated over 100 of these awards. Similarly, in 1985, 17 of the Science Digest top 100 innovations were attributed to DOE laboratories.

This impressive track record is made possible in part by the unique role the Department plays in the nation's scientific enterprise. DOE makes available its large scientific research facilities for use by the whole U.S. scientific community. These are large, expensive state-of-the-art facilities that are not available in industrial research laboratories or universities because of their large size and cost. These facilities include such devices as synchrotron light sources, research reactors, the combustion research facilities, and various accelerators. These so-called user facilities provide a tremendous resource for the scientific community and offer an environment in which industry, university and laboratory personnel work side by side. In the process of using these facilities, industrial researchers learn about new technologies developed in DOE laboratories and universities as well.

The use of DOE user facilities has expanded in recent years. In 1981, 260 industrial users representing 111 different companies participated in experiments at our DOE user facilities. By 1985, this type of participation nearly doubled to 513 industrial users representing 225 companies.

I will mention just two examples of industrial use. At the National Synchrotron Light Source in Brookhaven, computer manufacturers have been attracted to do advanced work using x-ray lithography to build smaller and more powerful computer chips. Another example is the Combustion

Research Facility at the Sandia National Laboratory in Livermore. There, laser diagnostic techniques and computer codes for understanding combustion in engines to improve efficiency and reduce pollution have attracted the involvement of U.S. auto manufacturers.

We have also made impressive progress in pursuing collaborative research projects with industry. In 1981, we had 17 collaborative projects with industry totalling $2.5 million. Last year, we had 44 collaborative projects totalling $16.3 million. That is more than a doubling in the number of projects and over a sixfold increase in dollar value. These collaborative projects are undertaken on a jointly funded or cooperative basis with industry and represent an industry-government partnership that utilizes the laboratory resources.

In 1981, seven new companies were started that were based on technology developed within the laboratories. In 1985, 27 new companies were formed based on technology spin-offs from DOE laboratories. In addition to new company starts, 244 separate technologies were transferred to existing firms in 1985 compared to 179 in 1981.

In the area of personnel exchanges, we have started the Industry Technology Exchange Program. This program brings industry researchers to the DOE laboratories to work with scientists and engineers on technology problems of particular interest to their company. These appointments are cost-shared with the company and last six months or more. We find this program effective in establishing strong laboratory-industry partnerships and in providing industry researchers with direct experience with laboratory scientists and resources.

I want to quickly cover several more steps that the Department and its laboratories have taken in recent years to improve innovation and technology transfer. Some laboratories have instituted more liberal policies that allow employees to do more consulting for industry. This has proven to be a useful technology transfer mechanism. The Department has also issued class patent waivers covering all its designated user facilities and its non-DOE funded work. These waivers allow the parties using our facilities to acquire patent rights to any inventions that arise during the course of their work. Several laboratories have also instituted a liberal leave policy that allows a scientist or engineer to take leave to try to start a company on his own.

I have used the term technology transfer frequently and have provided many examples of DOE's commitment to it. In its broadest sense it means the transfer of know-how. But there is no clear, tested model that an organization can follow and be guaranteed success in technology transfer. There are many avenues of transfer, ranging from simple personnel exchanges between our laboratories and industry to licensing patents resulting from laboratory work. I believe that almost every situation is different, and there is a need for flexibility and creativity in approaching the problem.

It is important to remember that technology transfer from the DOE laboratories to U.S. industry takes two willing partners. As I have described it, the Department and its laboratories have taken many steps to make technology available. By strengthening the capabilities of U.S. industry, the DOE laboratories contribute directly to our future economic competitiveness. However, U.S. companies must be willing to make the investments to develop products from new technologies for our efforts to be truly successful. A willingness to invest in new technologies often requires a company to make substantial financial commitments to development and new capital equipment. Often, a longer range view is required on the part of company management and investors. In short, the business environment in the country is a very important ingredient.

The Department of Energy is proud of its long history of providing U.S. industry with important technology to meet our nation's current and future technology needs. The DOE and its laboratories have made excellent progress in making federally developed technology available to industry, and, with the help and commitment of industry, we expect this progress to continue.

The FY 1988 budget reflects the Administration's continuing commitment to support high quality basic research that is essential to the nation's economic competitive position. For example, in the General Science and Research appropriation (designated as function 250 in the budget), funding for the High Energy Physics and Nuclear Physics programs increases about 13% from $719.2 million in FY 1987 to an $814.5 million request in FY 1988. In the Department's Office of Energy Research, other research programs are funded under the Energy Supply Research and Development appropriation (designated as function 270 in the budget). For the Basic Energy Sciences program, which supports basic research in materials sciences, chemistry, supercomputers, and geosciences, among others, funding is requested at $479.1 million in FY 1988. The Biological and Environmental Research program, with a request of $217.5 million in FY 1988, and the Magnetic Fusion Energy program, with a request of $345.6 million in FY 1988, are the remaining major research programs under my cognizance. Each of these programs continues to produce forefront science aimed at accomplishing program goals while, at the same time, making numerous contributions to the technology development that is so vital to the nation's economic competitive position. A smaller program, the University Research Support program, for which $13.4 million is requested in FY 1988, funds activities to strengthen the capabilities of universities and colleges to contribute to DOE longer range energy research and development needs and to take full advantage of the unique physical and human resources at the DOE national laboratories for university faculty and student research and education.

The cumulative effect of this basic research support results in a significant leveraging of our support to the laboratories, universities and industry. By supporting these programs, and the many unique user facilities associated with them, the Department sets the stage for university and industry researchers to interact with laboratory scientists and with each other. By providing opportunities for the best of our scientific talent to share their knowledge and innovative ideas, we can foster the kind of creative and stimulating environment that results in the development of "leading edge" technologies and a competitive position in the international marketplace.

That concludes my prepared statement. I will be happy to answer your questions at this time.

Chairman CHILES. Dr. Ross?

STATEMENT OF DR. IAN M. ROSS, PRESIDENT, BELL LABORATORIES

Dr. ROSS. Well, thank you, Mr. Chairman. I am also pleased to appear here and discuss the President's proposals on science and technology in the 1988 budget.

I am here really for two reasons—first, as my Senator pointed out, I head what is probably the biggest industrial R&D organization in the world, and as such we are critically interested in the technology that is provided through government funding.

Secondly, I was a member of the President's Commission on Industrial Competitiveness, and we concluded in our report just about 2 years ago that indeed, we have a growing, serious problem in industrial competitiveness, and that technology is a major part of the solution.

It is from that broader point that I would really like to speak this morning.

TECHNOLOGY OUR STRONGEST COMPETITIVE ADVANTAGE

The Commission concluded that technology was one area in which the United States has a competitive advantage. Indeed, we called it our strongest competitive advantage. And not only did we think that it should be nurtured and preserved, but if at all possible, that advantage should be increased.

I cannot resist on this particular day pointing out with some pride that technology has helped us gain or regain our competitiveness in yet another field, namely, boat racing. I do not think that is a trivial comment. [Laughter.]

Dr. ROSS. The Commission observed, as you observed, that our overall R&D is in good shape in the United States, but that not enough of it is aimed with industrial competitiveness as a goal. And, as your chart here suggests, if you look at the civilian R&D as a percent of GNP, we lag Japan, and we lag Germany.

Senator DOMENICI. Would you make that last statement again, please?

Dr. ROSS. The U.S. civilian R&D or, R&D that is aimed at civilian activities, as a percent of GNP is behind that of Germany and behind that of Japan.

Senator DOMENICI. Excuse me, Mr. Chairman.

Chairman CHILES. Go ahead.

Senator DOMENICI. What do you put in civilian there?

Dr. ROSS. Well, the roughly $50 billion that is done by industry and the portions of the Government-funded work aimed at basic research and university support.

Senator DOMENICI. Thank you.

MANUFACTURING TECHNOLOGY NEEDS MORE EMPHASIS

Dr. ROSS. We also in the Commission observed lag in translating our technology into competitive goods and services, and thus we felt that our manufacturing technology needs more emphasis.

I agree with the prior speakers that the Government role in nonmilitary R&D is primarily to support basic research, and also in stimulating greater industrial use of the federally funded research.

Industry must of course play a major role in R&D for competitiveness, particularly in the applied research and development of products and services. But since R&D is inherently risky and is inherently expensive, it is only the strong, healthy firms that can support strong programs.

Therefore there are many aspects of Government policy going beyond just budgeting for R&D that have an important bearing on the ability and willingness of firms to create the technology that we need. It has already been mentioned that trade policy affects our access to foreign markets, that tax policy affects the incentives for R&D. And I do hope that this Congress will move favorably on a permanent tax credit for R&D.

But really, anything that could undermine industry's role in technology should be scrutinized very carefully by all of us. And again this week, I must point out that we at AT&T are beginning to scrutinize the latest Department of Justice proposal to change again the telecommunications industry to understand what impact that may have.

PRESIDENT'S PROPOSED INCREASES PLEASING

Coming to the President's budget proposals for science and technology, I find them to be very much in line with the Commission's recommendations. I am particularly pleased with the substantial increase for basic research and particularly for that component of the National Science Foundation budget which funds the universities.

The universities are important to us not only for the scientists and engineers they produce, but they also provide a unique environment for basic research.

I am also very pleased with the proposal for science and technology centers. As I understand them, these would indeed help address the need to develop technology that will permit us to capitalize on our basic research.

In conclusion, then, I believe that the budget proposals are very consistent with the vital role of Government in supporting basic research and particularly supporting it in our universities.

Thank you, Mr. Chairman.

Chairman CHILES. Thank you very much.

[The prepared statement of Dr. Ross follows:]

STATEMENT OF DR. IAN M. ROSS
PRESIDENT, AT&T BELL LABORATORIES

BEFORE THE
COMMITTEE ON THE BUDGET
UNITED STATES SENATE
February 4, 1987

I am pleased to respond to the Committee's request for my views on the nation's science programs and their interaction with private industry in connection with its work on the Budget Resolutions for 1988.

Science and technology have been of critical importance to AT&T throughout its history. It was one of the first industrial firms to conduct a broad program of basic research. Prior to divestiture, the technology program was funded partly by the Bell Operating Companies. Since then, AT&T has supported the entire cost as a corporate commitment both to the immediate and long-term future of the company. I am pleased to report that, despite concerns expressed at divestiture, AT&T continues to support a vigorous research program. I am proud that over the years, the results of Bell Labs programs have helped produce the world's finest telecommunications network.

Today, however, I would like to discuss the budget proposals on science and technology from the broad perspective of their relation to our nation's industrial competitiveness. Two years ago, the President's Commission on Industrial Competitiveness (PCIC), of which I was a member, identified technology as an item of critical importance to competitiveness. In addition, we observed that it was one area in which we had an advantage. Specifically, we called it "our strongest competitive advantage."[1] Thus, it should not only be nurtured and preserved, but also increased.

Our report to the President observed that U.S. R&D performance, overall, was quite good when measured as a fraction of GNP. However, when we examine the various purposes of R&D, we find that we lag both Japan and West Germany in terms of R&D with industrial competitiveness as a goal.

We also noted a disturbing lag in the translation of technology into competitive goods and services. Manufacturing technology in particular, we found, needs attention.

The Commission agreed that a major role for government in non-military R&D is in support of basic research, a role that government has assumed. Government can also play a role in encouraging greater industrial use of federally funded research, in the universities as well as the federal laboratories.

Industry however must bear the major R&D role, particularly the applied research and development of the products and services it markets. Since R&D is inherently risky as well as expensive, only healthy firms will support strong programs. Therefore, all aspects of government policy must be examined for their bearing on both the ability and the willingness of private concerns to invest in the creation of the technology base so essential to competitiveness. Some policy issues are obvious -- such as trade policy which influences access to foreign markets. Tax policy also can create either incentives or disincentives and it is encouraging to note that a bill has already been introduced in the Senate to make the R&D credit permanent at 25 percent -- we hope that bill will be passed by both the Senate and the House.

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[1] Global Competition: The New Reality, the Report of the President's Commission on Industrial Competitiveness, Jan. 1985, p.18

Anything which would undermine industry's role in technology generation and utilization should be scrutinized by all of us in government and industry. As a very recent example, we at AT&T are examining the Department of Justice proposal to modify the Modified Final Judgment (MFJ).

The President's budget proposals for science and technology for 1988, I am pleased to observe, are in line with the recommendation of the PCIC. Although the budget for basic research shows a modest increase of 4 percent, the basic research funding for the national Science Foundation has been proposed to increase by 18 percent. This is especially significant since this is the principal channel for funding research in universities.

The PCIC report underscored the dual importance of universities to industrial competitiveness. First, they produce the scientists and engineers needed by industry. Second, they provide a unique environment for basic research. They are indeed a valuable national resource and deserve strong support from all of us.

The President also proposes the creation of five to ten Science and Technology Centers. Although somewhat similar to the previously created Engineering Research Center, they are -- to the extent that I understand the proposal -- directed at the concern expressed by the Commission over our national lag in exploiting our technology. This would be a highly desirable initiative.

Conclusions

One of the dilemmas addressed by the PCIC was the lack of broad responsibility in the federal government for matters relating to industrial competitiveness below the President. This being the case, it is important that all federal departments and agencies and all committees of the Congress weigh their actions against the urgent need to make our country more competitive.

There is general agreement that technology is a critical factor in competitiveness -- if not the critical factor. Congress must therefore scrutinize proposals for any tendency to weaken industry's ability or incentive to invest in R&D.

On the other hand, Congress should support initiatives which will strengthen our national position in technology. The President's proposals to increase support of basic research -- particularly in universities -- and to create Science and Technology Centers to help improve our lagging position in manufacturing -- represent initiatives I commend to the Committee for its support.

Chairman CHILES. Senator Wirth?

Senator WIRTH. Thank you very much, Mr. Chairman.

I am delighted to have you all here, and Mr. Chairman, I am delighted that we are focusing now on the specifics of the budget and are building an overall economic strategy. As Alexander Hamilton once suggested, I think, "He who controls the purse-strings rules," and if we can control the purse-strings in the direction and the ways that you all have suggested this morning, I think we will be a lot better off.

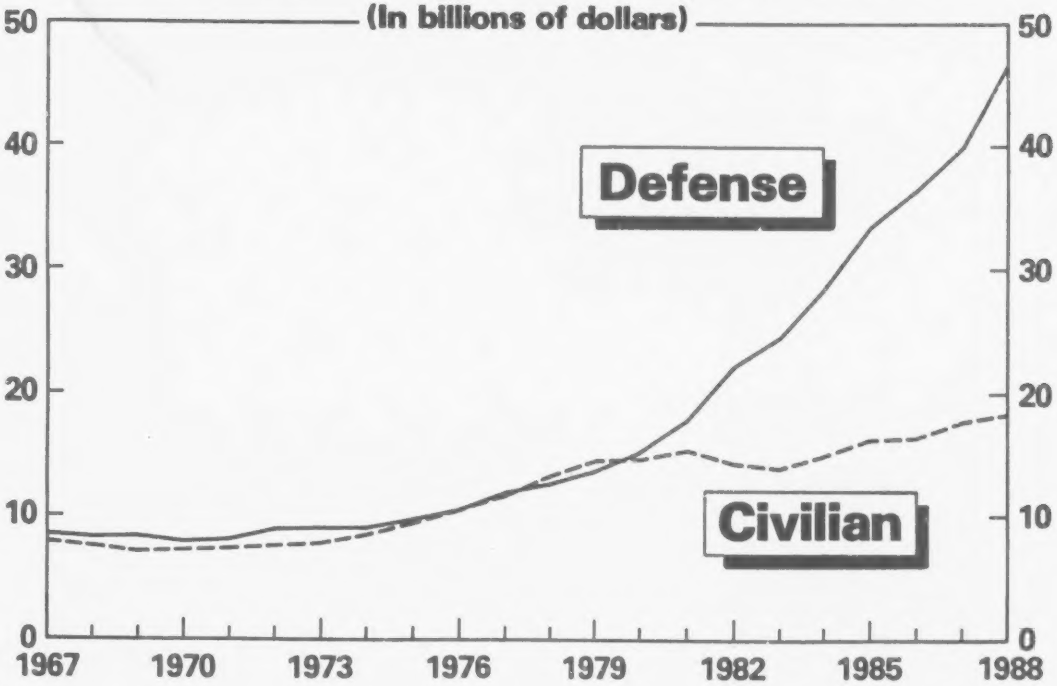
LOSING TRACK OF BASICS

I am concerned as we look at the framework of competitiveness. It is always useful in a political environment to have kind of a tag around which we can put a number of initiatives. But I am concerned that as we focus on that, we may be losing track of basics.

UNIVERSITY RESEARCH

One of those basics that troubles me is what goes on in the area of university research. If we look at the basic trends of funding for university research over the last 20 years, I think that the numbers suggest that it has declined very significantly—we simply have not kept up with the demand and need. I think if we look at instrumentation as yet a third area, I see in the Congress increasing efforts to warp the peer review process, which in my view has served us pretty well. And I worry about the trends that are suggested in these charts of the relationship between defense research and the civilian sector and what that may be doing to skew the fundamentals of university research.

FEDERAL R&D SPENDING



Senate Budget Committee Staff, February 3, 1987

I would like, if I could, Mr. Bloch, to have you and then the others, if they would like, to comment on what you think may be happening to the basic research establishment upon which the public and private sectors depend, including Dr.Ross, dintinguished facility.

Is this a concerning trend to you, Mr. Bloch, and if so, what should we be doing to assist you in countering that?

Mr. BLOCH. Well, what you should be doing is approving the budget for the National Science Foundation, obviously. [Laughter.]

Senator WIRTH. For years I have given you softballs, Mr. Bloch.

BUDGET REVERSES TREND

Mr. BLOCH. That is only one step. Sure, I am very much concerned about the trends that you are citing. I think what you are seeing in the 1988 budget is an attempt to reverse that trend.

I need to make something very clear. Basic research in the Federal budget has increased over the years, but as a percent of the total Federal R&D budget, it has been decreasing. That is our concern.

It is a better balance, that we are after. The universities have a large number of problems, no doubt about it. You mentioned instrumentation. That is certainly one of the issues that we have been focusing on, and I know Dr. Trivelpiece has also been focusing on it.

We are spending more today on instrumentation than ever before as a percent of the NSF budget. We are spending close to 18 percent of our dollars for instrumentation.

We have been looking at the adequacy of university research facilities. We have shared the results of a recent survey with the Congress and there is a problem in the universities in terms of facilities—no doubt about it.

From the National Science Foundation viewpoint, we informed the universities that they can request facilities dollars if the facilities are linked to the research that is proposed.

With our current level of funding, our priorities are attracting and educating more people, instrumentation and facilities, in about that order. But, we have not forgotten about facilities.

So, yes, the universities have a large number of problems, and I working on those is a focus of the 1988 budget.

Senator WIRTH. I appreciate your comments and your response. I just raise this because I think we have to keep our eye on the fundamentals, that even as we talk about "process technology," "technology transfer," and competitiveness and put out there some second-level agendas, none of that is going to work unless we tend to the fundamentals. And I just want to remind us of that.

I do not know if either of you have any other comments you might like to add.

SCIENCE BUDGET OUTSTRIPPED BY NEW IDEAS

Dr. TRIVELPIECE. I think Erich has said it very well. I would add only that one of the dilemmas on the equipment and people problem is the fact that there has been an explosion of new ideas. Scientists at universities, in laboratories, can see now the possibility of doing things that, 5 or 10 years ago, they could not even pose the questions properly, and now they would like to proceed with it. In order to proceed with it, it does take new facilities.

So it is a two-sided problem. Even though the Federal funding has gone up, the abilities and skills of those who would like to pursue these things has increased at an even more rapid rate—and I think potentially to the benefit of the nation, and unfortunately we cannot take adequate advantage of it.

Senator WIRTH. Is there any way of quantifying that, Dr. Trivelpiece?

Dr. TRIVELPIECE. I suppose picking biology would be a good example, that biologists of 5 years ago would not have been in a position to talk about doing the kinds of research now in terms of DNA sequencing and so on, that the experimental apparatus simply had not been invented yet. It has been invented now, and the possibility of asking and answering questions is very real. And they would like to get in the game as effectively as scientists in other areas have, so that there is a squeeze on both ends. There is a squeeze from the inadequate growth of budgets. There is a squeeze because talented people now see things to do that are very important to be done.

Senator WIRTH. My time has expired.

Thank you very much, Mr. Chairman.

Chairman CHILES. Thank you, Senator Wirth.

Senator Domenici?

Senator DOMENICI. Mr. Chairman, I would yield to Senator Danforth.

Chairman CHILES. Senator Danforth?

Senator DANFORTH. Mr. Chairman, thank you very much.

I am really here to lend my support both as a member of the Budget Committee and as a member of the Commerce Committee, especially with respect to the National Science Foundation's budget. I think this is very important.

Chairman CHILES. Senator Danforth, I wonder if I might just ask you for a favor. Senator Sanford has to go and preside in just a few minutes, and he wondered if he might go out-of-turn just so he can take over that important role of presiding over the Senate.

Senator DANFORTH. Yes, of course.

Chairman CHILES. Thank you very much.

Senator SANFORD. Well, thank you very much Mr. Chairman. I will not be very long. Coming from the university world, I have certainly come to support these recommendations and support what you are doing.

I would simply like to focus on one question, and maybe it is fairer to put it to Dr. Ross than to the others who has testified here today

BUDGET INADEQUATE TO MEET OBJECTIVES

I am impressed with the fact that competitiveness—based on the advance of technology as well as on research, and especially basic research—has been given more attention by this administration, and has in fact even proposed some increases in the budget for such purposes.

But I would like to ask Dr. Ross, for all of the increases, is this still not inadequate if we are going to have our objectives where your report and others have recommended that our objectives should be?

Dr. Ross. Well, I find it difficult to comment on adequacy in an era of very tight budgets.

Senator SANFORD. Well, that might be the only way to get out of tight budgets. If we doubled all science and technology funding, it would still have virtually no effect on the budget.

Dr. Ross. Well, for the long run, certainly a very good investment in the competitiveness of the nation is in the basic knowledge in our universities and in industry for that matter—but most of it comes out of our universities.

So I would encourage you to do everything that you can do within the budget constraints.

Senator SANFORD. Your Commission on Industrial Competitiveness certainly did an excellent job, and what I am asking is, doesn't this still leave your recommendations unfulfilled?

Dr. Ross. There is more that can be done, yes, sir.

Senator SANFORD. Good. Well, I would hope that we could have some additional requests, not to say that we are constrained by this budget. It seems to me this is our break-out point, and I would hope that the representatives of the government could perhaps come with a little bit more ambitious suggestion, without being disloyal to the administration. I think we need more.

I thank you for letting me go, but if I am not in there, the majority leader might give me a hard time.

Chairman CHILES. Thank you.

Senator Danforth?

Senator DANFORTH. Mr. Chairman, thank you.

R&D TAX CREDIT

Gentlemen, last year we decided to reduce the research and development tax credit from 25 percent to 20 percent and further, to sunset it. Some people have suggested that the research and development tax credit should be made permanent and perhaps even increased back to 25 percent.

Do any of you have an opinion as to the wisdom of making it permanent and increasing it?

Dr. Ross. Well, Senator, it was a recommendation of our Commission that it should be made permanent, that it should be at the 25 percent level, and preferably that it should apply to the total R&D base, not just to the incremental base.

The reason that we were suggesting this is that we are faced in this country with a higher cost of capital, higher interest rates, and this does tend to favor on any discounted cash flow basis the short-term decision rather than the long-term decision. And this puts other nations, in Asia, for example, at an advantage over us.

Senator DANFORTH. You mean if it is sunset rather than permanent.

Dr. Ross. Well, we thought the R&D tax credit was a good way, a permanent way, to stimulate more R&D investment in this country, and that we need it.

Senator DANFORTH. Does anyone else have an opinion?
Mr. Bloch?

R&D TAX CREDIT SHOULD BE PERMANENT

Mr. BLOCH. Yes, I would like tk comment on your question, Senatkr.

I think it is very important that the Congress send a message to industry with regard to research, and making that credit permanent is such a message. Research cannot be done in 1 year. It involves a long gestation period. People have to be hired, laboratories have to be outfitted, and you cannot do it on a 2- or 3-year basis. It is a 5- and 10-year undertaking at best.

The other thing I want to say is that you can not, absolutely relate cause to effect in areas of this sort. But I would claim that much of the support that the National Science Foundation has been able to muster for both the Presidential Young Investigators Program and the engineering research centers—namely, industry participation in these centers, in terms of dollars has been due, at least in part, to the tax credit, because it is cheaper now for these companies to invest in these programs. So I think the tax credit has been a stimulus.

How much did it help? I have no idea—but it sure did not hurt. Let us put it that way.

R&D FUNDS DISTRIBUTION POLITICAL

Senator DANFORTH. Thank you. Now one other question. We in Congress are politicians. We want to help our constituents. Part of helping our constituents is to try to get grants for institutions located in our States.

Do you believe that Government spending for research purposes should be decided by the Appropriations Committees of the House and Senate? Do you think that it is a good idea for us to determine what universities get specific grants and get specific facilities on the basis of who can marshal the votes on the floor of the Senate, or do you think some other criteria might be preferable?

Senator LAUTENBERG. Some of that evaluation, Senator Danforth, depends on whether your Senator is a member of the Appropriations Committee or not. [Laughter.]

Senator DANFORTH. I am just asking for a professional opinion. [Laughter.]

Mr. BLOCH. Our whole system and the excellence of the research that we are performing depends on how we fund research. And to make a judgment on that, I think, takes the expertise of scientists and engineers who are working in a particular field.

I think Congress obviously has a role to play, a big role to play, with the strategic allocation of dollars across competing activities.

But then, when it comes to one particular grant or another, I think the scientific and engineering community has to be the judge of where these centers are required and can best be implemented.

KEEP MERIT AND PEER REVIEW SYSTEMS

I hope that Congress will recognize that the merit review system that has been in existence for the last 30 years or so has really helped to make American science as strong as it is today, and continue in this particular role.

I want to say at the same time, however, that we have certain programs—and I mentioned them in my statement—that are trying to attract more people to science and engineering, broadening participation of both people and institutions. Those programs are aimed at raising the level of competence across the whole spectrum of science and engineering in universities and colleges.

To answer your direct question, I think the scientific and engineering community must be involved in making the judgment as to where the best science and engineering research can be done.

Senator DANFORTH. Any other opinions?

FEAR OF POLITICAL MEDDLING

Dr. TRIVELPIECE. I think Erich said that very well. I would like to add, how should it be? How should it be, I believe, is that academic institutions should, if they wish to get into a new area, decide to go out and, if necessary, hire a collection of Nobel Prize winners, have State or trustee funds made available to build the building, and then put together a proposal that is an absolute winner and compete; that is where the investment should be made.

Now, unfortunately, not every academic institution seems to be in a position to be able to make those resources available. Some States do not have the funds to do that. And it is certainly possible for the Congress to decide to have a building built at some location. But as long as that is the arena, it is the building of buildings, and perhaps it is not as dangerous, what I worry about is that that will gradually allow itself to get over into making a decision on choosing a particular research proposal that is highly ranked and replacing it with one that is not highly-ranked. Then I think that the boundary has really been crossed over and that that should be stoutly resisted.

But the universities themselves should try to make the investment in their future in a way that then permits them to compete in the open marketplace where excellence is the deciding factor by which things get funded.

Senator DANFORTH. Dr. Ross?

Dr. ROSS. I agree with what they are saying. I think the technical communities have fine mechanisms for setting priorities. They are very vocal people. I think you can leave in their hands deciding how to spend the funds.

Senator DANFORTH. Thank you very much.

Thank you, Mr. Chairman.

Chairman CHILES. Senator Lautenberg?

Senator LAUTENBERG. Thank you, Mr. Chairman.

Senator Danforth is a thoughtful person, and he is a serious person, and he posed an interesting question. But I would ask him if he has not been visited by some university, either professor or department head or president within his State, or maybe even his alma mater, to see what can be done to help, because they have the excellence to produce new ideas and things of that nature, that does not somehow or other translate itself into action down here. It is a serious question, Jack, and I agree that we ought to have a better way of settling it, but the pressure is always on to remember the folks back home.

In our State, we have some distinguished institutions. I even get visited by people like Dr. Bowen and others, surprisingly enough. [Laughter.]

BUDGET INCREASE IN ONE AGENCY DECREASES ANOTHER'S

Senator LAUTENBERG. I would like to ask Mr. Bloch a question here, and that is, as you praise the increased budget for the National Science Foundation, I know enough about you—all three of you—to know that you have very high professional standards, and I cannot imagine either one of you taking any particular satisfaction out of progress that you individually make with your respective charges at the cost of other research and development projects within our country.

And while your budget is up—I am not sure whether it is 15 or 16 percent, but something of that nature—are you aware, Mr. Bloch, of what is happening more generally with funds committed to research through this budget for the coming year?

Mr. BLOCH. Yes; let me just talk about that from an overall viewpoint. If you look at the total Federal R&D budget request for 1988, it is up 14 percent.

If you look at the civilian part of that, it up about 2-percent. Defense has about a 17 percent increase. That is what I focused on before.

The increases are different from agency to agency and department to department. But I will say that the 14 percent total Federal R&D increase, is a significant statement.

Senator LAUTENBERG. Would you have recommended that the National Institutes of Health, for instance, with some of the problems that we face in our country and in our world today, have an improvement in its budget?

Mr. BLOCH. Well, let me say one thing, Senator, about that. I am a novice in Washington——

Senator LAUTENBERG. That is two of us.

Mr. BLOCH. You are less one than I, I would guess. I have been here 2 years. I have been watching that, and I have always said that if NIH would make out as well with OMB as NSF does, and NFS would make out as well with the Congress as NIH does, both agencies would be in clover. [Laughter.]

PATENTS FOR GOVERNMENT SPONSORED R&D PRODUCTS

Senator LAUTENBERG. Unfortunately, the game results in peculiar outcomes. For instance, I am told that companies performing R&D under contracts for the government, in the military particularly, often decline to exercise their right to claim equity, licensing, in products they develop. As a matter of fact, I understand that there is a study that shows that fewer than 1 percent of the 8,000 patents produced by Navy-sponsored research and available for licensing are in fact licensed, while on the other hand, 13 percent of the Agriculture Department's patents are licensed.

Would you comment on that? Does that reflect something of the subject that we are discussing here in terms of the ongoing value of these? Anybody can respond.

[Pause.]

Senator LAUTENBERG. No one wants to answer?

PATENTS NO INDICATOR OF GOOD PERFORMANCE

Dr. TRIVELPIECE. It depends on the role that patents play and how they are viewed, I think, more than a comment on whether or not they are prosecuted. They are objects of value. The government research that has paid for it quite frequently generates know-how and technique and other attributes within the corporation that makes them more competitive, perhaps. The information is available to all through national laboratory type of research. That may make it usable, but not necessarily something that anyone tries to get an exclusive right to.

So focusing exclusively on patents as being the deciding factor as to whether or not you are doing well or not is perhaps not the right criterion. I do not know what the right criterion is, but that is one of the problems.

I think Dr. Ross would probably be in a better position to talk about patents than I am.

Dr. ROSS. Well, I think part of the problem here is that a patent is one thing, but in order to capitalize on it, industry will have to make a major investment. And unless you can be assured that you are going to be able to have a proprietary use of that investment, then there is a considerable disincentive to work on a government patent that is available generally.

IS R&D SPINOFF VALUE OVER-RATED

Senator LAUTENBERG. And there is certainly competition, however, for the funds available, regardless of what the outcome might be in terms of its long-term value.

Do we over-rate the spinoff value of ideas or products or developments that come from military research? I refer to their appplication to general, non-military life in the country.

Dr. ROSS. Well, I think we under-use it. I do not believe that industry at-large has made the best use it can of the technology that is in the good government laboratories. Now, it differs from industry to industry, but clearly, the steel industry has not benefitted from all the materials research that has been done in the government labs. I think that is more the problem than how it is rated.

Mr. BLOCH. Can I just comment on that last point that Dr. Ross mentioned. We should not only focus on patents; we should focus on information also. We have to make sure that the information transfer between national laboratories or universities, wherever the basic research goes on, takes place. And it takes two sides to make that happen. That is not a one-sided street. You cannot put the responsibility on the universities only or on the national research laboratories only. It is a people-to-people kind of interaction that makes this happen.

Senator LAUTENBERG. Mr. Bloch, I wanted to just touch on another subject. It is obvious that——

Chairman CHILES. Senator, your time has expired.
Senator LAUTENBERG. I am sorry. I did not see the clock.
Chairman CHILES. Thank you.

R&D QUID PRO QUO UNFAIR TO UNITED STATES

Mr. Bloch, and maybe Dr. Trivelpiece, might both answer this. One of the many things the U.S. scientific community can be proud of is the unprecedented access we give foreign scientists to our institutional facilities. As you say, we think we gain advantage through this interchange of information, by giving our own scientists a chance to work with their colleagues around the world.

But that ability to rapidly commercialize new technology is a key factor in maintaining our leading position in the international marketplace, and some of our foremost competitors do not allow our scientists the same access to their facilities.

Recently, I understand the Review Panel of the National Academy of Science has concluded that the best of the Japanese scientific and technological research takes place in federally supported institutions. The best of our research seems to take place in privately supported institutions. We open up our institutions to the Japanese but my understanding is that we do not have access to many of their government-supported institutions.

So we again have a situation in which the Japanese get the best of the deal. We are giving them access, and we know that they are good at taking something and building on it. But we do not have a two-way street since we do not have that same kind of process coming from them.

I would like your views on how do we deal with this problem. Should we be limiting foreign access, or is there some way we can make sure that they are opening access to us? I do not think we can continue along this route, given them access but having them deny access to us.

UNITED STATES MUST PUSH TO PARTICIPATE IN JAPANESE RESEARCH

Mr. BLOCH. Let me try to answer this question. It is a very troubling and a very profound question that you are posing.

Let me say categorically, we should not limit the access that foreign students and foreign professors and researchers have to our universities. I think we gain a great deal.

But we should insist on quid pro quo.

Chairman CHILES. How do we insist?

Mr. BLOCH. Well, let me give you an example. You are absolutely right when you say that most of the basic research in this country goes on in universities. Not true in Japan. In Japan, it is in government laboratories and in the private sector—whereas here, it is in the universities and the private sector, and obviously some of the government laboratories.

The National Science Foundation took it upon itself to go after a Japanese program that is called ICAD, or Fifth Generation Computer Program. It is one of the most prestigious programs in Japan. It is government-funded. Japan's university professors and researchers are participating. It has its own laboratory in the middle of downtown Tokyo, and it involves industry participants.

We went there and asked Japan and the ICAD management to open up that laboratory to visiting researchers from the academic world in the United States for an extended period of time. You can always go in for 8 hours, but that is not what we had in mind. We wanted to send people over there for 6 months or 9 months or 12 months or 2 years, to work there and learn, and at the same time, contribute—just like many of the Japanese people contribute over here.

The management of ICAD agreed to that, and we now have the right to have there at any point in time two people, two researchers of our choosing, from the university community to work in those laboratories.

My point is that we must push for it, and we must target a particular area, and ICAD was a big target because it is a highly visible activity in Japan and around the world. You should know that after we did it, France did the same thing. They went over there and made the same agreement. I must point out that we have access to most, if not all of the government laboratories in France, England, Germany, and so forth; there is a quid pro quo there.

The NRS in France has many laboratories. Most of the research going on in France is in government laboratories and not in universities, and we have full access to those.

Where we have that, I do not think we should have any problems. Where we do not have it, I think we should push for it.

FOREIGN ACCESS TO U.S. PROJECTS AUTOMATIC

Chairman CHILES. Well, I am delighted to hear your answer. But if we are sort of giving them general access, without them having to go through and target it, is there somebody who is saying, "Well, there are some that are not quite as important, but certain ones are important, and we want to have access to them." In other words, I want it to be a two-way street. That is what we all want.

Are we systematically seeing that we are getting in? Are there places where they are closing it to us—and is anybody monitoring that?

Mr. BLOCH. Well, I am sure there are places that are closed today, but I am not so sure that we have asked for these places to open up.

Chairman CHILES. Well, then, maybe that is the answer, that we need to systematically ask.

Mr. BLOCH. That could very well be the case. I think it is very important to target a couple of specific ones, like ICAD, and make the point, and hopefully, out of that will come a more general realization that this is a two-way street, and you only get something if you give something.

Chairman CHILES. Absolutely.

Senator DOMENICI. Would the chairman yield?

Chairman CHILES. Yes, I do.

PRESIDENT MUST ASSUME TWO-WAY RESEARCH STREET

Senator DOMENICI. I wonder, Mr. Bloch, if you would consider this as a possible approach. I agree with the chairman that this is a problem. What if, on our trade bill that is so much talked about, we put in a little language just giving the President of the United States the authority to deny access here to any country that denied reasonable access there—not have the exercise of it in any respect, but just so that if you found it, you could indeed say, "Well, that is unfair; you have got to stop on your end."

Would anybody object to the discretion to turn them down if they turn us down? I do not think we have that authority under law now.

Mr. BLOCH. Well, I think one needs to be very careful how one words such a thing. I think a message from Congress would be very important.

But on the other hand, I think we must jealously guard—and rightly so—the independence and the openness of our universities. And I hope that in the process of trying to pry something open, we do not harm that openness and that culture.

MUST BE GIVE AND TAKE BETWEEN NATIONS

Chairman CHILES. But we have to convince the Japanese we will play hardball. They have wrung their hands with us as the trade deficit went from $5 to $15 billion to $30 billion to $55 billion, and we never did anything—not a thing. And so, I think part of the problem now is a product of our inaction, and unless we convince them, and unless we are prepared to do that, why should they open up? They have the best of all worlds now.

Mr. BLOCH. Again, let me say I am in full sympathy with your view. We would like to work with you so that we do not do damage, on the one hand, while we are trying to fix the problem somewhere else.

Chairman CHILES. Thank you, sir.

FUNDS FOR NEW SUPERCONDUCTING SUPERCOLLIDER

I have one more question. Dr. Trivelpiece, last week the administration announced its plans for construction of a new superconducting supercollider, and I understand the project is going to cost some $5 to $6 billion. Unfortunately, the President had not included any funding request for this project in his budget.

Could you outline the cost of the project, how that money will be spent, and how the Department of Energy intends to go about site selection for the project? [Laughter.]

That last one is one all of us here probably have a little interest in.

Dr. TRIVELPIECE. Let me talk about the last one first, then.

Chairman CHILES. Good.

Dr. TRIVELPIECE. The Domestic Policy Council meeting at which the President presided when this material was presented to him took place last Thursday; he made up his mind Friday morning, and we had a press conference Friday afternoon at which the Secretary presided. He indicated that on February 10, we will make known all these matters about the process of site selection and so on. So we are not quite ready to go public with all the details of that, except to reiterate that we are going to establish a process that is a level playing field so that all the States that have indicated an interest in this have an equal opportunity to compete for it.

With regard to the budget, a 3-year program of about $20 million a year resulted in a conceptual design report, which indicated that the total project costs are about $4.4 billion. Now, that is $3 billion for the construction, and that is a very firm number and is probably accurate to within a few percent. The remaining portion is $1.5 billion. That involves some of the detectors and the commissioning of the R&D that needs to go along during the course of this process that is taking place.

The number of $6 billion comes because that is $4.5 billion, escalated with the current OMB inflation estimates over roughly a 10-year period. So $4.5 billion and $6 billion are really the same number; it is $4.5 billion in 1988 dollars.

As you indicated, we did not get the process completed with the President in time to include this in the 1988 budget. We do not anticipate asking for any additional funds in fiscal year 1988. We will operate within the budget that has already been submitted by the President.

For fiscal year 1989 and the other out-years, obviously we will have to bring forward a construction data sheet which includes the out-year estimates. Those are being prepared and organized with OMB right now, and as soon as we can send the amendment to the Hill, we will do so.

Chairman CHILES. Thank you, sir.

Senator Domenici?

Senator DOMENICI. Thank you, Mr. Chairman.

PEER REVIEW SYSTEM COULD EXPLODE

Let me make an observation and then see if you have any comments with reference to peer review. I understand the Senator from Missouri raised the issue. He has become on the floor of the Senate, at least it appears, a staunch advocate of peer review in terms of the selection of scientific projects, programs, and buildings.

I am a staunch advocate. On the other hand, I have told major American scientific groups that I from time to time get concerned because I think they should know there is a certain lethargy that goes into this process.

I happen to know some of the scientists that have to come up here—and Dr. Ross, perhaps you have done this, and perhaps you have not—but I know some, and they come and hide out for 2 weeks, and go through reams of these little packages. One of the reasons I know, believe it or not, is that my wife is a peer reviewer for a completely different aspect of something in the country, and she has it all over the kitchen table, reading and studying.

But I think sometimes there is a legitimate concern of the "buddy system" taking over. I think there is a legitimate concern that some of the scientists could take it less seriously than they should. And I think there is a concern that why fight success, so you know if this one kind of works, it goes high up on the list to get the next one because it is the institution that caused it to work last time.

I merely want to suggest that wherever you can and wherever you can as officials, you ought to remind the scientific community that this is terribly serious, and if Congress finds any of these things that I have just described here—they allege them all the time, so they ought to know it—but if they find them, that peer review system is going to explode, because you know, now we are moving toward billions of dollars dependent upon that kind of activity by fellow scientists deciding to feed or not feed some other fellow scientists in a very real sense, and their projects and programs.

So I really believe that is frightening, and I hope you all understand that it is. I do not mean it as a question. If you feel like answering, fine; if not, just leave it there on the record.

Mr. Bloch?

PEER REVIEW SYSTEM BEING MONITORED

Mr. BLOCH. Yes, I would like to make a comment on it. We are taking very seriously what you have put forth. We just had a committee in place, in fact, an advisory committee of outside people, under Dr. Norman Hackerman, the president emeritus of Rice University, and former chairman of the National Science Board, to review peer review processes—fairness in participation, and so forth. We are making changes to our processes continually to assure that there is equity there. In the selection of reviewers themselves, we are broadening participation by including representatives from large and small schools, and from industry as well as universities.

We are very keenly aware of the problem that you mention. The Hackerman Committee gave the peer review system in the National Science Foundation high marks for equity, but we have got to be alert and continually try to improve the system, and that is what we are trying to do.

Senator DOMENICI. My last comment on that. If you are doing that as it applies to that portion that you have to have peer review on, I hope you understand that you ought to keep telling the lead Members of Congress and the committees that you are constantly looking at it, because there is no broad understanding up here that you are doing that.

Dr. Trivelpiece?

PEER REVIEW MAINTAINS STATUS QUO

Dr. TRIVELPIECE. Senator, while it is absolutely essential that the peer review system be used, it also does have a defect in it which is along lines that you have touched on. That is, it tends to preserve a status quo. It does not provide an opportunity for certain young scientists who come into interdisciplinary areas to get funding, because of a tendency to disregard their efforts, not from the peer point of view, but from the point that, well, this one does not fit in our in-box, and there are some interesting cases in which there have been rather outstanding failures.

I think we, during the administration of peer review, need to pay attention to this all the time, and to see that there is appropriate attention paid to the opportunities for new scientists and new areas.

Senator **Domenici**. Dr. Ross, let me take this opportunity, which I should have done in my opening remarks, to personally welcome you. People would not know that my poor little State has had a magnificent relationship with Bell Labs. You have been the managers, nonprofit managers, of the greatest engineering lab in the world—and I think it is that—Sandia Laboratories, an offshoot of our atomic weaponry. You are the ones that furnish its president every year, and you are the ones that furnish the format for its method of doing research, which accounts for its success.

We want to keep that relationship, and we thank you for doing it. Actually, it has done something great for the country, and I just want to compliment you for it. Maybe it is a headache from time to time.

Dr. **Ross**. A small one.

Senator **Domenici**. If you wonder why I am opposed to the repeal of the Warner amendment, which you ought to know something about, it is because labs like yours have had very little to do with what we did 45, 50 years ago. Because you have a dotted line down to Sandia base, you may need 40 new lawyers to defend against 40-year-ago activities.

SUPERCONDUCTOR SUPERCOLLIDER

Let me move to the issue of the superconductor supercollider, although I have a number of questions in between—and Dr. Trivelpiece, let me make a couple of observations.

We do intend to ask foreign countries to participate in the program, not only by way of ultimate participants, which they must be in using it, but we are going to ask them to pay for part of it, aren't we?

Dr. **Trivelpiece**. Yes, that is correct. In fact, the statement is that we plan to proceed with this using the maximum possible cost-sharing from other countries, the private sector, and State and local governments. The Secretary is obliged to try to do that.

Senator **Domenici**. Now, with reference to State and local government, have you already decided that States and localities, in terms of the ultimate choice, that we are going to use as one of the guides how much they want to put up; is that going to really be a part of the criteria?

Dr. **Trivelpiece**. It would be impossible for it not to be. However, it should focus first on the technical considerations for the site and those other policy matters will obviously influence the decision in the end.

Senator **Domenici**. Well, I hope that the criterion is an adequate site in all respects and that ancillary to it is that where some wealthy State can go out and throw in $10 million where another State cannot, but everything else is absolutely perfect in it, so we can decide up here how that goes.

I do not think it would be good at all to have States get into a few million-dollar bidding war in a $6 billion project. I just want that on the record. I think I have told you that before, but I will continue to say it.

Dr. **Trivelpiece**. I agree with that position.

Senator **Domenici**. Do I have time for one more question?

Senator LAUTENBERG [presiding]. Sure. Go ahead.

CREATION OF SCIENCE CENTERS

Senator DOMENICI. The centers in the President's new science proposal, Mr. Bloch, what are the centers that you are going to establish around universities in this area? Tell me a little bit about the new ones.

Mr. BLOCH. Well, the centers that we are going to establish are primarily in the science areas. We agreed to establish three plant biology centers with the Departments of Energy and Agriculture starting in 1987, as a joint operation.

There are examples from almost all areas of science. We have about nine materials research centers today where a wide range of materials research topics are explored. We need to support centers like these in other areas.

We have centers planned in the social and behavioral sciences—a geography center, for instance, where we can put together the resources necessary for geographic research to be done in a modern way.

All of the centers are geared to three major things. First of all, to give you enough of a critical mass in terms of people as well as of instrumentation to pursue a particular avenue; second, to involve industry, like in the engineering research centers; third, to have an influence on education, undergraduate as well as graduate.

These centers can be in many different areas—just as in the engineering research centers. We did not say we wanted a center in ceramics or a center in robotics, or what-have-you. We went out with a general description and general criteria, and we got something like 140 center proposals. I think the same thing will happen with the science centers.

Many of the proposals that we received for the engineering research centers were on topics that we would not have thought of ourselves. So we really want the community itself, together with industry, to come up with proposals along the lines that are the most important for both science and industry.

Senator LAUTENBERG [presiding]. Senator Exon?

Senator EXON. Thank you, Mr. Chairman.

WILL BUDGET CUTS AFFECT SCIENTIFIC MISSION

Gentlemen, welcome. I am very pleased that you are here to discuss the importance of science and technology as far as our future is concerned. It has to do a great deal with the funding levels that we have the responsibility to recommend.

Some of my questions today will be referenced by other responsibilities I have on another committee known as the Armed Services Committee, which ties in a great deal with some of the things you are talking about here.

First I would like to ask, as we look to the future, do any or all of you feel, as I do, that the administration's proposed 28 to 30 percent cut in funding for education, including loans to students, in the current budget would have any adverse effect on the whole field of bringing forth the scientists and the people that we need so desperately in the future?

[Pause.]

Senator Exon. We can flip coins or draw short straws as to how you want to do it. I do not care how it is answered.

Mr. Bloch. Let me comment on the area that you are citing. Again, I think one has to look at the total budget request of the administration.

Like in any budget request, some trade-offs had to be made. You cannot fund everything that you would like to fund. I was not party to the trade-offs that had to be made accross the Federal government. I have responsibility for NSF, for basic research in general, and university research in particular.

There are many things in the NSF budget proposal that speak to education. In fact, the President himself in the state of the Union message and the accompanying fact sheets, talks to science and mathematics education in our pre-college area as a very important activity and gives the responsibility for that to the Department of Education together with the National Science Foundation.

In the end was a balancing act, and as a consequence, you see certain areas not as heavily stressed as you would like. That is true throughout the budget.

Senator Exon. I guess I can only deduct from your response to my question that you do not believe that a 28 to 30 percent cut in the education budget will have any significant effect on our developing of the future scientists that you think we need.

Mr. Bloch. I would have liked to have seen a much bigger budget in all of these areas. In fact, I asked for a bigger budget for the National Science Foundation and did not get it.

SCIENCE POPULATION BASE DECLINING

Dr. Trivelpiece. As a former professor, I am always concerned with education, and I like to see it expand in all its various dimensions. If you look at the science and technology aspect of that, it turns out that the work force now is about 3.5 percent engineers. That is up by a factor of 3 since 1950. It is growing all the time at an increasing pace. And in the face of that, we are looking at a decline in the 20- to 24-year-old population by 30 percent from 1980 to 1999.

So we need more people, and the population base from which we are going to get them is declining. Therefore, I think it is incumbent on us to try to do more to encourage minorities and women to take up careers in science.

Some of the education budget you are talking about obviously has an influence in that area. But this is part of an overall problem with the administration trying to define its priorities, and it presents its priorities here, and it is for the Congress then to try to put its own stamp on those particular priorities. 02

But like Mr. Bloch, I did not have any involvement in this part of the debate that took place within the administration. I argued for the science budgets that are in the Department of Energy as best I could, as he did for the National Science Foundation budget.

Senator Exon. Dr. Ross?

Dr. Ross. Well, clearly, I had nothing to do with setting those priorities. But I support your concern that student aid is a very important facet of a total science and technology program. And I think you should be concerned about the balance between that and the other aspects of the program.

Senator EXON. Thank you very much, Dr. Ross. That is my concern. I am not talking about increases in the aid to education, to make it clear. I just think maybe we should be freezing a lot of these things, and I am sure that education can take some cuts.

I guess I am very much alarmed about the size of the cut that is made, and I recognize as a former Governor who had a balanced budget for 8 years in a row, that you do have trade-offs.

I guess you are concerned, but what you are saying is that you did not have anything to do with it. And I accept that fact.

SEMICONDUCTOR MARKET

Let me follow up on a concern that came out in some of the other questions that I have heard this morning, and that is particularly with regard to the Japanese. It seems to me that the Japanese are moving quite speedily and quite effectively, I might say, to capture the largest share of technology and production of semiconductors.

Now, number one, do you share the concern that I have in this area; and specifically, I am asking about whether or not you think it would be a good idea for the United States to authorize, and not step in, under the antitrust laws that we can step in with, to stop the sale of the semiconductor and chips part of Fairchild to Jujitsu, a Japanese giant in this area. I guess I am asking shouldn't we be concerned about allowing the Japanese, when we can stop them, to move into an area such as this, which is critically important to our national defense and the needs of our overall economy and competitiveness in the future.

SEMICONDUCTOR COMPETITION EXPENSIVE

Dr. ROSS. Well, let me try and address that one. The semiconductor industry, the health of it, is a very major concern to all of us. There is no question that, as you say, the Japanese have a determination to succeed in that business; they have focused on it, and they have done extremely well.

However, I think we cannot blame them for doing that. We should look to what is happening in our own industry, and I think part of our problem here is that the semiconductor industry is extremely demanding, demanding in development funds, which is expensive, and demanding in capital funds.

You know, when you double the number of components you put on a chip of silicon every 18 months, which is what you are doing, you have to rebuild your factories about every 4 years, and each of those production lines costs about $100 million.

So I think what this comes back to is that we must, whether it is through the tax laws, whether it is through the cost of capital, the interest rates, or the antitrust laws, do everything we can to encourage our industries to flourish again in their field.

I do not think this is yet a technology issue. We have the basic technology. But I think that you should look at the antitrust laws and be sure that in this Nation, we can put together the size and scope of industrial organizations that we are competing with in Japan.

Senator EXON. Thank you.

Mr. Bloch, you have had some experience in this area, and I would also like to have your comment.

CONCERN OVER LOSING SEMICONDUCTOR INDUSTRY

Mr. BLOCH. I would be glad to discuss that. I am very concerned that we are going to lose our semiconductor industry in this country, and I do not think we can afford that outcome. Semiconductors are at the base of much of what we are doing industrially both today and in the future. Some of the developments in semiconductors can be applied to many other industries themselves.

Therefore, losing this very important, basic field of industry is extremely undesirable. We also cannot be dependent on Japan either from an industrial or a military viewpoint, for our major components. That is a major problem.

As you know, there are some proposals underway, both by the semiconductor industry and by the Department of Defense task force, to help in this particular situation through combined private and Government funding of a research/development/manufacturing activity that would develop new processes and new equipment, and I certainly support this.

Let me come to your last question concerning Fairchild. Let me remind you, Fairchild is not an American company.

Senator EXON. No; it is not an American company, and I hear that all the time. It is a French company. But the French companies are not the ones we are primarily concerned about, and I know that very well, and I appreciate your making that point.

The point is that I think it is in the interest of the United States and the free world not to have the Japanese have a major control over the semiconductor industry. I wish the French did not own Fairchild, but I cannot change that.

STOP COUNTRY/COMPANIES WRECKING OUR INDUSTRY

The question I am asking you is do you think it is in the interest of the United States to allow that to proceed, or do you think we should stop it if we can?

Mr. BLOCH. I would rather not see that happen. I am not so concerned with Fairchild itself, but with the future control of the semiconductor industry.

Senator EXON. Well, that is exactly my concern.

Mr. BLOCH. You start with one, and it is the domino effect. Next time, it is somebody else, and then it is somebody else, and before you know it, you do not own any of these companies.

So for that reason alone, I would say that we should try to stop it.

Senator EXON. Mr. Chairman, I will go over and vote. I do not know whether my time is up or not, but I will be back.

Thank you.

Chairman CHILES. Well, that is very nice of you fellows to go and vote and leave me the right to question some more. But we will be here when you get back.

Senator EXON. Thank you.

TELECOMMUNICATIONS INDUSTRY HURT

Chairman CHILES. Dr. Ross, you mentioned the Justice Department proposal to modify the AT&T antitrust decree. One point is clear. How we structure industry can help or hurt American jobs and American competitiveness.

We had a $200 million trade surplus in telecom equipment in 1982. We opened up our markets thanks to the decree, while others stayed closed, and last year we had a $1.6 billion deficit.

What kind of impact will the new Justice Department proposal have on American jobs and research?

Dr. ROSS. Well, the reason that I raise this is my concern as to just this issue, and what impact it may have on our telecommunications and information technology, which is very important.

It has been a short time since we first saw this, and we need to study it. But I must say I was amazed, considering that the Department of Justice relief they wanted was to separate the competitive from the monopoly businesses in order to encourage competition within the telecommunications industry. I was amazed to see a proposal that seems to go back on that, after only 3 years, without any substantial change in the background of it.

I am certainly concerned if we are going to have yet another upheaval in the very vital telecommunications industry. I do not think we need that in the national interest at this point in time.

TECHNOLOGY FOLLOWS OVERSEAS MANUFACTURE

The other point I think we have to look at very carefully is the suggestion of the divested telephone companies going into the manufacturing business. We have to ask ourselves just where they would go for that manufacturing capability.

It is possible—some of us feel it is likely—that they would have to go overseas in some kind of alliance to get the manufacturing expertise to provide what they need. If that were the case, then I think we would be impacting our balance of trade by importing major network equipment from overseas. And of course, once you move the manufacturing overseas, then the development will follow it, and the basic technology will follow it.

So I think we need—and I hope you will look very carefully at what the DOJ proposal is, what impact it will have on our industry, on the jobs in industry, and on the technology that underlies the telecommunications industry, or what is now more broadly the information industry.

Chairman CHILES. Thank you, sir.

ANALYZING SCIENCE RESEARCH BUDGET

Mr. Bloch, I am pleased to note the administration is requesting a sizeable increase in the funding for the National Science Foundation. This year's 17 percent increase and the commitment to double NSF funding over the next 5 years are important steps toward our commitment to strengthen scientific research in this country.

I want to put these increases in perspective. The President has proposed less than a 3 percent increase for civilian research and development. The bulk of the increase is slated for NASA. Research at the Department of Health and Human Services, the Department of Agriculture, and other domestic agencies would be cut if the President's budget is enacted as it has been sent to us.

So isn't this budget giving with one hand and taking with another? Can the increases in the NSF funding compensate for the cuts we will be having elsewhere?

Mr. BLOCH. Well, that is a very difficult question, to answer, but let me say the following.

The increases for the National Science Foundation are in recognition of the fact that we have been under-funded, or that our balance has not been right—both of these have not been right in terms of civilian basic research.

Chairman CHILES. Yes, sir, but we are not taking from the military research and giving to the civilian research. We are taking partly from the civilian research and giving to the civilian research.

Mr. BLOCH. Well, some of it is taken from civilian development areas and put into basic research, and I think that is probably a proper role for government to play, to focus on basic research and education, focus on the generation of people, and get away from some of the things that——

Chairman CHILES. Would you say we should be cutting agricultural research? Are we in such good shape in our farms right now that we can do that?

Mr. BLOCH. No; obviously, we should do a lot more on everything, there is no doubt about it. The question, as I said before to your colleague, is one of balance and it is a question also of priorities, because you cannot do everything in the budget.

Sure, we all would like to see much bigger increases in all of these important areas. From a priority viewpoint however, focusing on universities, focusing on basic research, and focusing on education are probably the most important things we can do. And that is where you see the focus in the NSF budget.

CIVILIAN/MILITARY RESEARCH OUT OF BALANCE

Chairman CHILES. As we look back at the figures from 1960 through 1981, basically we see that civilian research and military research were roughly balanced; they were about the same. Now, 70 percent of the research dollar goes to the military.

What are the long-term implications of a science policy so heavily-weighted toward defense research? I know there was a time that defense R&D was well in advance of anything in the civilian sector. Isn't the civilian technology now as advanced, perhaps even more advanced, than the military technology. Should those civilian R&D centers have a more equal share of what we are seeing our total research and development dollars going to?

Mr. BLOCH. You know, the problem with defense research is not what we are putting in there for but the fact that very little of defense R&D accrues to basic research. It is less than $1 billion, in fact, of a $40 billion budget. If, for instance, defense would spend more of its dollars on basic research, I think the fall out into the civilian sector would be very great.

So I think it is a balance in the defense budget that is very important, and that probably has not been achieved over the years.

On your other point, you are absolutely right. There has been tremendous fall out, and there still is today, from defense into the civilian sector. But one should not under estimate the fall out from the civilian sector into defense. And that is certainly more prevalent and more important today than it was in the 1950s.

The whole balance between and within those areas is what needs some adjustment, and I think the budget that you are seeing in the Foundation is trying to take a step in that direction.

FOREIGN ENGINEERING STUDENTS

Chairman CHILES. Over 50 percent of our engineering Ph.D.s granted by American universities are awarded to non-U.S. students. Foreign students have taken some 30 to 40 percent of all doctorates in mathematics and physics granted by U.S. universities in recent years.

How big a problem is this? Certainly the universities gain some financial advantage from the overseas students. We know that not all of these students go back home; some of them stay here.

But overall are we gaining or losing from this practice? Are we helping our competitors by allowing their young people access to our schools? Does it work to our national advantage?

One of our problems, is that Japan, with literally half our population, is graduating more engineers than we are in this country. If 50 percent of our capacity is filled with foreign students, is it because we do not have U.S. students to fill that capacity? I would just like to have your views, and Dr. Ross, I would like to have your views on this subject, too.

Mr. BLOCH. Let me start off. That is a concern that I have had and have expressed for a long period of time. Our budget is really trying to address that. We are increasing the number of graduate students that we are supporting significantly in this particular budget.

But let me make a specific comment. The fact that most of these students, especially the ones that are going for Ph.D.s, are staying here; about 60 percent, roughly speaking. I think that is good. We need these people in the work force. They are extremely well-qualified. If we could count on them remaining here at that 60-percent rate, I would not have any problem with it.

CAN'T DEPEND ON FOREIGNERS

My concern is that we are depending on a resource over which we have no control. It can stop tomorrow morning. It happened, for example, with Iranian students and it could happen to us with other countries.

We need to bolster the American component out of self-defense if nothing else, because we cannot depend on that particular resource.

Also, as other countries are becoming more self-sufficient in industry, have more job openings and better facilities, many of those students might go back and no longer stay here. That is a concern that I have—a very great concern.

With regard to your other point, while we are educating people, and then they go back and they compete with us, do not forget that at the same time, we are getting something out of them while they are here. All those Ph.D. students do work—and do some very good work, by the way—while they are going for their Ph.D.s. So it is not that we are giving everything and we are getting nothing back in return.

It is very helpful that we have students from other countries who are educated in U.S. universities. I think it helps us greatly in terms of their understanding our culture, and we have an easier way of communicating with them. So it is not a loss only; it is a great gain to us.

But I am concerned that we are depending on a resource which might get shut off tomorrow morning.

Chairman CHILES. Dr. Ross?

U.S. INDUSTRY MUST USE MORE ENGINEERS

Dr. ROSS. Yes; Mr. Chairman. I see this problem somewhat differently. I think the concern here is not that there are so many foreign and particularly Asian students in our graduate schools. I think the concern is that there are so few U.S. students going into the technical schools. And in my view—and there is a fair amount of evidence to support this—this is a question of supply and demand, that the number of students going into particular disciplines is very much determined by what the job market is.

Now, one of the problems I think we have in our industry is that we have fewer engineers in our factories, on the factory lines, than the Japanese do and the Asians do. And if we are going to compete with their superb manufacturing capability, we are going to have to put more engineers on the production line—which means we are going to have to have a bigger demand by industry for engineers—and that in turn, I think, will lead to more students going into engineering, more students going into science, and I believe our universities will——

Chairman CHILES. Which comes first there, the chicken or the egg?

Dr. ROSS. I think what comes first is the job demand. If there is a demand for people to build things rather than to go into investment houses and play the merger game, you will get more people going into engineering school compared to going into business school. I think that is what comes first.

Now, as far as the Asians in our universities, firstly, this is a compliment to the strength of our universities. Secondly, I think it reflects the determination in some of these nations that they are going to succeed in engineering. And I think in the long run, it is probably good for us. If we keep our manufacturing strong and keep it competitive, then having the other nations become more advanced in their understanding of technology and use of it is going to be helpful to us. It is going to provide markets to us. You do not sell many high-technology products into rice paddy fields. You have to have a fairly advanced infrastructure, and if that comes out of some U.S. training, as long as we keep our industry strong, I do not see that as a major problem.

COOPERATIVE RESEARCH GOOD IDEA

Chairman CHILES. Mr. Bloch, several States have launched their own initiative to bring business and university researchers together to make sure that our best ideas get taken directly to the marketplace. I know in my own State, the Florida High-Technology and Industry Council has brought together leaders from Government, academia and business to promote cooperative research ventures. They have formulated a 5-year program with a significant contribution from State government that will combine our resources to get the most bang for the buck.

Doesn't it make sense that the Federal Government, when it makes its research grants, should consider and give preference to those groups that have brought together industry and academia and State governments into cooperative ventures? Wouldn't they quickly find out that that is something that works? Wouldn't that save the Federal Government money by combining our resources with those of State government and business? Don't these cooperative ventures springing up from the grassroots offer us the best chance of funding research that can really meet our competitive needs? We will know what industry will be talking about, what their real needs are, rather than academia saying what they think the needs will be?

SUPER COMPUTER CENTERS

Mr. BLOCH. Well, I think, Mr. Chairman, that works both ways. There are a number of programs in the Foundation where we are focusing on exactly that. I will only name two for you. Supercomputer Centers were established essentially with the idea——

Chairman CHILES. Let's us take the Supercomputer Centers for example. It is interesting to note we have established a Supercomputer Center at the Florida State University through some Department of Energy funding. It seems to be one of the top centers. Yet it is not named in part of the National Science Foundation as one of the centers. I think it makes sense to recognize there is already a center going from one department of government, and it should be a shared thing.

Mr. BLOCH. Well, if I remember the time frame correctly, that center got established at about the same time—or maybe even before we finished our solicitation——

Chairman CHILES. Before, I think, yes.

Mr. BLOCH. Yes; before we finished our solicitation for the Supercomputer Centers. We have five centers in existence today. That is about all we are going to put in place.

We are focusing now on making sure these centers stay at the state-of-the-art, and also that the networking, the access to these centers, is what it should be.

GOVERNMENT WORKS AS CATALYST

But let me come back to you earlier question. I think it works both ways, and that is why I wanted to say that many of our programs—Engineering Research Centers, Super Computer Centers—really demand that States, universities and the private sector contribute to them.

It works the other way, too, and since Senator Lautenberg is here, let me mention New Jersey as an example. We established an Industry/University Center (ICU) on ceramics at Rutgers University—$800,000, something like that—a few years ago. The State of New Jersey not only contributed to that center, but encouraged the establishment of five or six similar centers in that state.

So, sometimes the Federal Government goes in and becomes a catalyst for something that then takes on its own life. Other times we insist that States and universities and the private sector develop collaborative proposals to gain support from us.

I think one should look at both of these mechanisms and not give one preference over the other.

Chairman CHILES. Senator Domenici?

FOREIGN RESEARCH SCIENTISTS FILLING GAP

Senator DOMENICI. I want to just take a couple of minutes. Dr. Ross, I do not know if your answer would have been the same to the chairman's question had he broadened the scope from engineering and engineers, which I think you were answering, and broadened it to research scientists.

We have a shortage of research scientists that are American, and these niches are getting filled by foreigners. That may be supply and demand, and that we do not have as many qualified ones that want it. But we have something to do with that problem because we have not been consistent enough in offering opportunities in that field; and secondly, our educational system has not excited the young people in that regard.

The National Science Foundation is fully aware of the second part, and is going in exactly the reverse of what some people thought, but probably the right way. They are starting way, down in the early years of childhood and exciting young kids about math and science. Eventually, our people have to come out of high school much more excited and much better-prepared.

But we do not want to just do that and then not have a scientific career that is challenging. And I think in that regard, we have to spend more money so that there is consistent research being done, and potential, and give you all in the private sector the maximum opportunity to do research.

"MERGER MANIA"—GOOD OR BAD

I am wondering if you might not for the record, if you feel like it, tell us what you think about "merger mania" the last—well, let me not editorialize—the merger policies of our country over the last 3 years and the possible impact on research and development by corporations.

I do not want your answer now, but maybe you might want to answer that. Is it all right? Has it had an adverse effect? Is it apt to, or not?

But let me finish my line of questions on technology transfer or science transfer. And this is to any of you, but in particular, Dr. Trivelpiece and Mr. Bloch.

LACK OF DEFENSE-ORIENTED TECHNOLOGY SPINOFF

Basically, we are already aware, and it is on the record, that one of the real bottlenecks in technology transfer is in the Federal laboratories—not by way of saying they are not good laboratories; they are the greatest, Sandia, Los Alamos, Oak Ridge—but because of our own rules and regulations, and because they are partly defense-oriented, we are not getting civilian transfers out of them anywhere close to the proportion that the Japanese public labs are getting it. Obviously, they are in there for that reason only, and we have a dual reason.

But I am convinced that we have to do better at that, and I am convinced that the government is trying. But I am also frustrated when I find that we are just about to make some headway, and here we come along and adopt an amendment up here that makes it even harder to get clearance to have any technology transfer in areas that are defense-oriented, if somebody just says it is apt to be dangerous because it is defense-oriented. You know the amendment that I am referring to—well, one passed in the dark of an evening, making it yet easier for the Defense Department to say no technology transfer because national security is involved. And we were just about starting to make some headway.

NSF SHOULD EVALUATE SPINOFF OF TECHNOLOGY

I am just going to give you a suggestion. I think as part of the President's initiative, you ought to consider whether there is a problem, and if there is, you ought to find some way to make it all easier from the government's standpoint to let the private sector get into the business of licensing and technology transfer. And you ought leave nothing out--do not leave Defense over there, that they can do their own. Evaluate it all, and be realistic. It is not working.

Am I correct in dollars, Mr. Bloch—there is no equivocation that Japanese dollars spen in their labs cause more direct marketplace activities than our dollars spent in national laboratories?

Mr. Bloch. I would say that is probably correct.

Senator Domenici. I know it is, and I think the scientists have already told us.

Mr. Bloch. But you should also understand that many of the national laboratories, as you said yourself, have a dual role to play, namely defense, and that is not true about the ETL Laboratory in Japan. It is what we would call civilian research.

Senator Domenici. I am going to quit, but I am going to tell you, you would be amazed, Mr. Bloch, running the National Science Foundation, if you were put on a group to take a look at how long and how difficult it is for an idea that is ready for the marketplace to get cleared through the Department of Defense or the Department of Energy. And I am not blaming Dr. Trivelpiece, but it is absolutely true. In fact it borders on being so frustrating that they give up, which is one of the things that really does bother me.

Now, Al, maybe I have overstated the case, but I do not believe so.

Dr. TRIVELPIECE. Well, the Department of Energy is a large and complex collection of facilities, and what you say is true at some and not true at others.

Senator DOMENICI. All right.

Dr. TRIVELPIECE. So in some cases, a good job has been done to try to get these things out. But as I said in my opening remarks, what troubles me is not so much that the Japanese are taking advantage of their own laboratories as that they are taking advantage of ours, and that our own industry is not taking as fair-a-share advantage of them as they could. So we see 10 or 15 Japanese scientists, but we do not see the 100 researchers from U.S. industries at DOE laboratories, where they could be.

Senator DOMENICI. Thank you, Mr. Chairman.

Senator EXON [presiding.] Senator Lautenberg?

Senator LAUTENBERG. Thank you, Mr. Chairman.

MANUFACTURING SHOULD BE COUNTRY'S BIG CONCERN

I want to get back to a subject earlier discussed about the marketplace providing the incentive for directing educational interest among young people. And if you saw me shaking my head, it was a declaration of my doubts, if not disbelief, that that is going to have an effect soon enough to make a difference, because the lag between committing one's interest and actually establishing a career in A, B, or C is fairly substantial.

We are now under incredible competitive pressure, as each of us knows. I come from the field of technology, although I am not a technician in the pure sense of the word. Each of you knows that our technology edge is what we are trying to hang onto. That is our competitive edge. By the way, Dr. Ross said something about manufacturing.

It is my firm belief, as the Senator here who has been in the field of technology, that a principal focus for our society ought to be on manufacturing. Technology is moving because there is opportunity, incredible opportunity, out there, and people recognize it all over the place, and I would like to get back to the basics for jobs and for investment.

When do you think a young person makes a decision about the career opportunity? Is it in grammar school? Anybody.

Dr. ROSS. Well, I have to go back to ancient history, which is when I made my decision, but it was in late grammar school, yes.

FOREIGN STUDENTS REMAIN IN UNITED STATES

Senator LAUTENBERG. When we read in the papers about young people making millions in a year working on Wall Street and doing quick underwritings and things of that nature, low when in the devil is someone going to say, "What I want is a nice, slow, steady career where I can build my assets and my securities and so forth"? It just does not wash, very frankly.

I think that we have to engage ourselves more directly in the process. I do not want to manage the economy. I am a free-enterpriser. I was the head of a fairly significant-sized corporation.

The thing that was discussed here before was the percentage not so much of foreign students coming in for the higher degrees—we know that that is an interesting phenomenon that often the honors are walked away with by many of these students—but that American students lack an interest in science. You said, Mr. Bloch, that 60 percent remain here. How do you know that, and do you know whether that violates the immigration laws in any way?

Mr. **Bloch**. I do not know the last one, and I probably would not want to find out, either.

Senator **Lautenberg**. I am sure you would not.

Mr. **Bloch**. How do we know that? We have ongoing survey process. These are sample surveys, not 100-percent surveys. And by the way, my number was for Ph.D. students. I did not talk about undergraduate students. It is in the Ph.D. area where we have the problem of attracting our own people.

INTEREST IN SCIENCE LACKING IN STUDENTS

Senator **Lautenberg**. Here, we have two eminent scientists, leaders in the field each of you—and thank goodness you decided or someone helped you decide to come to America to make your home—but there are two out of three of you each born elsewhere. And once again, it is a welcome resource, and we are pleased that you made the decision.

I still cannot figure out why it is that we cannot encourage students who are born in this country and raised in this country to go ahead and make the decision.

Dr. Trivelpiece, do you have a comment?

CHILDREN MUST BE CHALLENGED EARLY

Dr. **Trivelpiece**. I would like to comment on that. I think children start out as natural scientists. They want to know only why, for the pure intellectual satisfaction of getting that question answered. It drives parents nuts; it drives a lot of people nuts. But they start life with that kind of curiosity. I think that the first few years in school probably tend to stifle that curiosity in a way that is very unfortunate.

Science is very competitive, and just like to be a world champion in tennis, you probably have to start at 5 or 6 years old to be a world champion in science. Children have to start in science at probably the same age. And there is a differential that begins to creep in. As the information is not made available and their curiosity is not continually challenged, they tend to fall behind, and science does not become the most interesting thing that they could possibly do.

So I think that the right place to focus is to take the long-range view of this and look at our grammar schools and high schools and try to see to it that the necessary competitive edge is provided for them so that science is explained in a way that piques their curiosity, and not in a way that kills it.

I know that in many ways, I think I became a scientist to some extent in spite of some of the education that I received, not because of it.

Senator **Lautenberg**. So then, Mr. Bloch, although he is new to Washington, has developed the diplomatic skills necessary to walk through some treacherous ground. And when you were asked before by Senator Exon, I believe, about the decline in investments in education, basic education, how does that square with the goal that we talk about of building this infrastructure to continue America's leadership? There is a serious problem there.

Mr. BLOCH. Can I just comment on that and follow up on what Dr. Trivelpiece said? I think preparation for people in high school and before high school is extremely important. If they do not have the skills in mathematics and an interest at least in science when they get out of high school, it is too late when you get into college.

That is why we are focusing on and why other agencies are focusing on, pre-college education in science and mathematics as one way of attracting and preparing more people.

U.S. VALUE SYSTEM NOT CONDUCIVE TO HIGHER EDUCATION

I wanted to comment, also, on the point that you made. I agree that once the marketplace gives you the signal that there is a need for scientists and engineers, it is too late, because it takes a long time to produce engineers and a scientists. We have to keep the pipeline filled and take some risks with it.

By the way, I have not seen over a long period of time—you see it sometimes in a year or in 2 years—unemployment of scientists and engineers. I think it is practically nonexistent. It is at a 1-, 2-, 2.5-percent level, which is really not unemployment in the true sense of the word. So that tells you that there are jobs out there.

No doubt about it—many of our students instead of going on to the Ph.D. degree are being attracted by immediate opportunities. You mentioned Wall Street. There are other opportunities in industry that they are attracted to, and the difference in the cost of completing a Ph.D. degree is very high, as you know, and takes a long period of time. Our value system is not conducive to attracting people to higher education.

WHAT STARTING PAY PH.D. CAN EXPECT

Senator LAUTENBERG. I would ask you this—if I can have a minute more, Mr. Chairman—do any of you have an idea of what a recent Ph.D. graduate might get in the industrial—forget about the academic marketplace—what might they get in the industrial marketplace by way of a really top flight wage? Do any of you have any idea? What about Bell Labs, if they were hiring now?

Dr. ROSS. Oh, I think you are talking in the $40,000 range.

Senator LAUTENBERG. I can tell you this. I spoke to the deans of seven of the top business schools—I am a Columbia Business School graduate—the top business schools in the country, and their senior students, their achievers, can walk out and get a six-figure income today. That is quite incredible. So why waste your time doing the other thing?

Dr. ROSS. Senator, that gets back to this supply and demand thing. I think we need to raise the prestige in the scientific

Senator LAUTENBERG. It has to be a national effort. In my view, it just cannot be left—and again, I am a proponent of the marketplace—it just cannot be left to industry, when there are jobs begging for people to fill them, and still the wages are relatively modest on the scale.

Dr. Ross. I agree with you. And you know, it is distressing to see well-trained scientists make the switch to investment banking late in their education, for just the reason you describe.

Senator Lautenberg. I want to ask one last question, Mr. Chairman, of Dr. Ross.

Do you know how many people—if that is not a professional secret or business secret—how many scientists or advanced degree people work for Bell Laboratories?

Dr. Ross. We have at the moment about 20,000 employees, of whom 14,000 have advanced degrees.

Senator Lautenberg. Do you know how many of those are foreign-born?

Dr. Ross. I do not, and we do not discriminate by national origin.

Senator Lautenberg. Of course not.

Dr. Ross. But my guess is it is in the 15 percent range, but do not hold me to that.

Senator Lautenberg. I can tell you that in another situation, similar, in New Jersey, a research facility, the percentage runs close to one-half, masters degrees and above. And again, we welcome that resource that comes from other countries who want to be here, but by golly, there is something so terribly wrong about the stimulus, incentive, or motivation. We need to say to our young people, hey, being a scientist is a noble profession, it also pays decently. That is the problem that I think we have to attack as a government.

Dr. Ross. Well, Senator, one thing I think is of more concern. We have areas in my company where 50 percent of the new employees are foreign-born.

Senator Lautenberg. Thank you.

Thank you very much, Mr. Chairman.

HAS RESEARCH SUFFERED AT BELL LABS

Senator Exon [presiding]. Thank you, Senator.

A followup question to that, Dr. Ross. Bell Labs has been known as one of the nation's most brilliant sources of discovery and innovation. Now with the break-up of the former communications system in the U.S. telephone-wise, and now that AT&T must survive in a competitive environment, has there been a change in the direction of research at Bell Labs? Have there been any significant reductions in the amount and scope of your research?

Dr. Ross. Well, I know this has been a concern to a number of people and particularly to us. The magnitude of our basic research in the company, which is about 10 percent of our effort, we spend about a quarter-billion dollars per year on basic research. That total effort is slightly greater in terms of number of people today than it was prior to divestiture. I think that is the concrete evidence that indeed our basic research has survived, and I think it is a great compliment to my management that they consider that the investment in research that underlies the information business is important to the long-range future of our business, and they are willing to invest in it.

Senator Exon. I guess your answer to my question was that you have not seen any significant change?

Dr. Ross. Well, I have not seen any significant adverse change that was driven by divestiture. Now, in a technology that is moving so rapidly as ours, yes, we are changing all the time, but we are changing to exploit the technology.

GOVERNMENT/BUSINESS SCIENCE TRUST

Senator Exon. I am pleased that you are here this morning because, with your expertise and knowledge and background, you give me the opportunity to float a trial balloon that I have been looking at. That trial balloon can best be described, I think, as the possibility for the establishment of a technology trust.

As you know, under current law that is promulgated by the Congress, working through the President and Executive, institutions which develop patentable inventions under their federally owned research programs retain title to the inventions and patents, and the Federal Government retains the right to use these inventions without charge.

I have been working on a suggestion that has come to me from one or two sources, given the budget crunch that we are under now and the budget crunch that we are likely to be under in the future, as to whether or not we should look at some kind of a trust in this area. Under this idea—and I want to see what you think of it—any institution which receives Federal research funds would agree to give the U.S. government a small portion—2-percent, 3-percent, 5-percent share—of any future profits which directly result from their federally funded research. The royalties, then, would go into this technology trust to finance additional research and student assistance in science and technology.

While most federally funded research will not produce significant profits—and I understand that—even a small royalty on only a handful of successful patents could make a major contribution to such a trust.

What is your view of this? Do you think is would be possible or workable? How would such a suggestion be received by those who are presently receiving grants? And if you do not think it is a good idea, could you suggest some other source of funding for such a self-sustaining technology trust as I am talking about?

TRUST GOOD IDEA BUT WITH CAVEAT

Dr. Ross. Well, Senator, the concept that a company would be willing to pay a license fee for a government-owned patent, I think, is a perfectly sound thing. But when we do license patents, and when we do pay license fees, we frequently need the assurance that we have the exclusive use of that patent.

Now, I think if the government is willing to provide exclusivity to one of its contractors for a patent or for an idea that was generated on government funds, if it is willing to take that step, then I think you will find many people in industry willing to license and pay the license fee.

Senator Exon. Dr. Trivelpiece?

TRUST IDEA ALREADY PRACTICED

Dr. **Trivelpiece**. The Department of Energy does this in certain circumstances already, much along the lines that you are suggesting, with only one small variation. For instance, the National Synchrotron Light Source, which is located up at Brookhaven, is used by IBM and Xerox and a large number of other companies as part of their efforts to develop the micro-lithography for the next generation of some of the super-computer chips or computer chips.

If the company concludes the right kind of agreement with the laboratory, which it can, it can take away the exclusive proprietary rights to whatever is developed as a consequence of its work.

At Argonne Laboratory, there has been recently set up a nonprofit corporation which is attached to the laboratory and which can receive the patents that are developed by the laboratory and market them. Under that arrangement, then, the laboratory receives some of the funding back to help defray the cost of its own activities, which indeed does benefit the government. The University of Chicago receives some of that, and there is a trap-door: should a patent make the developer wealthier than we think it should then the override returns back to the Federal Treasury directly.

It is different in different DOE facilities, but the germ of what you are talking about as an idea is being done in some circumstances, and I am sure it is possible to be extended to other kinds of institutional arrangements.

Senator **Exon**. Is there any rule-of-thumb percentage of take--I mean, I think you have got to leave most of it with the people who are doing the work. Just for discussion, I had say 2, 3, 4, 5 percent. Those programs that have been handled in that matter, is there any rule-of-thumb?

Dr. **Trivelpiece**. We have guidelines. I happen to forget what the splits are for them. I would be glad to provide them for the record, however.

Senator **Exon**. I would appreciate that very much.

[The following was subsequently supplied for the record by Dr. Trivelpiece:]

ROYALTIES TO INVENTORS

In recognition that the DOE management and operating contractors are diverse, flexibility is allowed in the guidelines regarding the percentage of royalties that may be retained from waived inventions to accommodate different operating needs. The general guideline is that the majority of net royalties should be used at the DOE facility for scientific research, development, technology transfer, and education purposes consistent with the R&D mission and objectives of the facility and the congressional intent reflected in the legislation and accompanying colloquies. Royalties may not be used for the augmentation of general DOE program funds. Inventors will be given awards, in accordance with laboratory policy, for each year in which royalties are received from a particular invention.

Mr. Bloch?

Mr. **Bloch**. I do not think I can add any more to what has been said.

Senator **Exon**. Do you think that that might be one way that we could put some money back in to recapture—in other words, we are saying if it does not fly, if it does not amount to anything, it is a loss; if it does amount to something, maybe we should tap it for some kind of a fund. Do you like that concept?

Mr. **Bloch**. Well, let me tell you, I think what Dr. Ross has focused on is very right. It is one thing if a company has an exclusive on license, and it is another one if it is one of the pack. I think one needs to differentiate between these various things.

So, rather than putting a blanket on everything that gets licensed, I would really be very selective on it.

Senator **Exon**. Thank you.

LAWS ON BOOKS TO ACCOMPLISH TRADE NEEDS

I just have one last question. You have heard a lot today about suggested programs for making us more competitive, laws, rules, regulations, red tape, and the new buzzword, I take it, is "competitiveness". The President has held a meeting at the White House, or is about to, in regard to competitiveness, trade loss, call it what you will.

Some of the restrictions that we have been talking about here, good and bad, have been worked over for many years. I was in Japan recently and had a meeting with Ambassador Mansfield. We were talking about the fact that we had not been tough enough on many countries, including the Japanese, in some of these areas. Mike Mansfield, former majority leader of the U.S. Senate, told me that, "Well, the fact of the matter is, I do not think a new trade bill or a new competitive bill would do a great deal. I think under the current laws that we have, if they were properly enforced, we have the means to do what we are talking about doing with new legislation."

What do you think about that? Dr. Ross?

Dr. **Ross**. Well, I agree with the Ambassador. I think we have most of the legislation in place, and if properly enforced, will permit us to protect our intellectual property with people who are willing to play fairly with us.

And could I add one other thing. I do not see that we have a problem with the Japanese as far as the fair payment for use of our intellectual property.

Senator **Exon**. In fact the Japanese, if any, are among the better ones to get along with in that area, as I take it.

Yes, Mr. Bloch?

Mr. **Bloch**. I agree with the Ambassador. We probably have enough legislation. The important point is that trade bills are defensive, designed to close something. We need to get on the offensive. We have got to be better, and we have got to be there first, and that is what these budgets are all about.

Senator **Exon**. So, take the offensive and get off the defensive. What we are talking about is new offensive laws that in most cases, as near as I can tell, are already on the books. So we may be spinning our wheels to some extent doing with this.

Gentlemen, we appreciate so very much your coming here. You have been patient with your time. We are half an hour into your lunch hour.

This meeting is in recess.

[Whereupon, at 12:32 p.m., the committee was adjourned.]

WRITTEN QUESTIONS FROM SENATOR LAUTENBERG TO DR. TRIVELPIECE AND THE RESPONSES

1. Please comment on the substantial shift from civilian to military R&D in the Department of Energy's R&D budget since 1981. Please indicate the percentage of research funding increasingly directed to weapons-related research.

The Department's defense R&D budget is determined in coordination with the Department of Defense and the Office of Management and Budget in order to support the Nuclear Weapons Stockpile Memorandum. The Department's defense activities have been growing to support the President's overall goal to increase defense activities by three percent real growth. This increase has been necessary to modernize our nuclear deterrent capability. In the fiscal year 1988 budget request, defense-related R&D is 52 percent of the Department's R&D funding.

Energy R&D funds are maintained separate from defense-related dollars without tradeoffs being made between the two areas. Decreases in the energy budget have not been used to fund defense activities but reflect the appropriate role for the Federal government in energy development. In those areas where there is clearly a strong Federal role, the Department has supported increased funding. Decreases have been proposed where the private sector or the market place should take the lead role.

2. Last summer, the Tokamak Fusion Test Reactor achieved record-breaking plasma temperatures of 400 million degrees Fahrenheit at the Princeton Plasma Physics Laboratory. Will sufficient funds be available in the FY 88 budget to maintain the TFTR schedule for the deuterium-tritium "breakeven" experiment?

The Tokamak Fusion Test Reactor has met or exceeded many of the original goals for the experiment, including the attainment of ion temperatures of more than 200 million degrees Centigrade (approximately 400 million degrees Fahrenheit). It remains one of the highest priority activities in the U.S. Fusion Program. Consistent with that priority, the FY 1988 budget includes increased funds for tritium systems and shielding to maintain the present schedule for deuterium-tritium "breakeven" experiments in 1990.

3. The FY 88 budget includes authorization and initial funding for design and construction of the Compact Ignition Tokamak. The TFTR project will be shut down after 1990 to help provide the funding for the CIT. What assurances can you provide that the CIT will be funded adequately to maintain a schedule calling for completion of the project in 1993? What are the long-term prospects for development and utilization of fusion energy?

The Compact Ignition Tokamak (CIT) represents the principal U.S. experiment in support of the common, mid-term goal of all the national fusion programs, namely, the Engineering Test Reactor (ETR). The CIT's mission is to realize for the first time a burning plasma in the laboratory. In so doing, the CIT will be providing the physics data base for optimal operation of an ETR. In international fusion policy meetings on the ETR, both the European Community and Japan have supported the project and have emphasized that timely completion of CIT is essential to such an objective. The project funding profile described in the FY 1988 budget, which shows a total increment of $55 million required in FY 1989 for construction and operating, would be sufficient for project completion in 1993. We plan to support this schedule to the extent possible while maintaining the appropriate balance in the program.

The long-term prospects for fusion development are bright. The Magnetic Fusion Program Plan (MFPP), developed in 1985, lays out the steps required for the successful development of fusion energy. Upon reviewing the progress of the program in light of the MFPP, the Energy Research Advisory Board's Technical Panel on Magnetic Fusion finds "that fusion energy continues to be an attractive energy source of great potential for the future, and that the Magnetic Fusion Energy program continues to make substantial progress toward the development of fusion energy." The CIT is an integral part of resolving the Properties of Burning Plasma issue, one of the four key issues in the MFPP.

4. Please describe the status of the plan for U.S. participation in a multi-national engineering test reactor.

At the end of October 1986, the U.S. government proposed to the European Community, Japan, and the USSR that they and the U.S. "... join together to produce one technically acceptable design for the essential next step in the world fusion program through the effective unification of our design efforts and supporting research." The specific product from the proposal is to be a "... conceptual design report for an Engineering Test Reactor. ... This proposed effort should provide a level of detail sufficient to prepare any nation, or group of nations, for subsequent decisions on whether or not to construct such a device."

The transmittal of the proposal was followed by a series of formal and informal meetings of the various parties for the purpose of ensuring broad understanding of the terms of the proposal. The preliminary reactions from the other three parties were positive, though not representing formal governmental positions. These discussions made clear that a set of specific "Terms of Reference" would be valuable to document the common understanding and to serve as a Charter for the formal activity. The IAEA was viewed as the appropriate forum in which to convene a meeting of the four potential parties to consider such Terms of Reference.

The U.S. government developed and transmitted a set of draft Terms of Reference. Having taken note of these developments, the Director-General of the IAEA invited the four potential parties to a meeting in Vienna to consider the draft Terms of Reference. It is expected that the meeting will occur in early March.

SCIENCE AND SPACE TECHNOLOGY

MONDAY, MARCH 9, 1987

U.S. SENATE,
COMMITTEE ON THE BUDGET,
Melbourne, FL.

The committee met, pursuant to notice, at 9:30 a.m., in the Gleason Auditorium, Florida Institute of Technology, Hon. Lawton Chiles (chairman of the committee) presiding.

Present: Senator Chiles.

Staff present: Douglas Olin, assistant director for budget systems.

OPENING STATEMENT OF CHAIRMAN CHILES

Chairman CHILES. Good morning. We are pleased to be here today in the Cradle of the American Space Program for a hearing of the Senate Budget Committee.

With all that the space program has accomplished, we have still yet to solve a very fundamental puzzle. After all these years, we have not yet come up with a program that moves in a steady way from one phase to the next.

CONTINUITY OF PROGRAM UNCERTAIN

From the early years of Vanguard and Explorer, through Mercury, Gemini, Apollo and the Space Shuttle, the program has moved ahead many times by slowing down, then speeding up. Whatever continuity we have managed has been a product of policy choices and funding debates, as well as has been colored by uncertainty.

The program is in that condition right now.

The *Challenger* tragedy exposed a painful list of shortcomings. Many of those were the product of pressures induced to some extent by an obsession with the calendar. Launch. Keep flying. The funding depends on it.

That does not, of course, excuse the design and technology mistakes. But the pressure of funding surely added another layer of worry to a program traditionally unsure of where it was going because it rarely knew for sure where it would be allowed to go next.

Science seems to prosper when it can move in an environment where the funding base is secure. It has always been remarkable to me that the space program has accomplished as much as it has when its future has always been the subject of so much debate.

It seems to me, we must finally make a commitment to a set of programs we can count on. Certainly the Federal deficit is a cloud over the space program as it is a cloud over all other plans we want to make as a nation.

BREAKTHROUGHS BEING SQUANDERED

But as you look around the world, you will find nations shaking their heads at the number of times the United States has made breakthroughs, then squandered the advantage of those breakthroughs.

Our semiconductor industry is one example. Norm Augustine, who is with us today, is chairman of the Defense Science Board. The Board's recent report raises the same concerns I've raised with Secretary Weinberger about an American defense industry which could come to rely on foreign producers for key defense components.

From machine tools to automobiles, we are scrambling to hold our own in industries we once dominated.

We can't do that in the space program. We have invested too much and we've come too far to say we must close up shop and let others take the reigns for awhile.

We started the manned orbital programs, then moved on to moon flights. Each program was a step in a logical direction. We learned from each step. We built a space shuttle, and we learned from it. We will continue to learn. It will be fixed, and the shuttle will fly again.

The Space Station is the next logical step. It's going to be expensive. We are not sure what we will learn from it. But we can be sure we will learn nothing if we abandon the program.

Everything we have achieved as a nation has been the product of investment. We have been builders and explorers with a healthy dose of daring. And while we have always been grateful, we have never been satisfied with the today passed on to us by the previous generation. We have always wanted to do better, to hand something on to the generation to follow.

EDUCATION PROGRAMS LAGGING

And that has a deep meaning for the current state of education programs in America. We are a tower of technology in the world, but we've started to learn. The skilled engineers we need to keep the lead aren't coming out of our colleges at the same rate they're coming out of Germany and Japan. If we want to stay on top, we've got to get moving.

The President's budget includes a 30-percent reduction in funding for education programs. Now, what do you think that will mean to our future prospects as a nation? What do you think that will mean for young people who want to go to school, earn their degrees and assume the good jobs where they can make a contribution to tomorrow? It will mean hard times.

For some time now, I've been talking about the need for this country to rediscover and assert its economic power. That means the ability to deliver a rising standard of living on a sustainable basis. And I think the space program is a key part of that effort.

It represents the cutting edge of technology, where modern day explorers push the frontiers of learning and innovation. We have to keep moving ahead in space and education. But we have to ask some questions.

Where will the money come from? When we have an initiative like the space station or the supercollider at the top of the physics pyramid we can't just wish them into existence. We have to make room for them. And we have to make room for the less glamorous but no less important science projects.

ESSENTIAL QUESTIONS TO BE ASKED

So our hearing today must ask a host of essential questions.

Is there a consensus voice within the space community for what steps to take next?

Can a set of priorities be developed now for the balance of this century that will have us reach goals we can choose from?

Can we make the program a source of adventure and imagination and at the same time assure it is dependable funding?

Can NASA demonstrate an improved way of converting what we gain in the space program into the way we live on earth?

Can we make that toughest of decisions where we either make modest efforts in many areas, or we make mighty efforts in few areas?

What can we do to stimulate innovation in our schools, and make sure that our students are equipped with the skills necessary for the modern workplace?

How can we promote closer cooperation among schools, business, industry and Government to move the Nation ahead and to move it with speed and quality?

The Budget Committee is not the committee that makes the final policy choices. But we are the modern equivalent of the shoe horn, where with all the competing demands of society we must try to find a way into the national spending plan.

Our panel today is composed of people with experience and ideas. Each of you knows the problems far better than I do. Yet each of you knows the opportunities, as well.

I hope you will be equally candid about both areas today. We need your help. The country needs the space program. It needs the test-educated and most creative people we can produce. Our schools need to be the best and our students the brightest.

I like to think we are a restless country that's tired of treading water. We want to do better. Today, you can help us get started.

Our first panel today is going to be composed of Mr. Dale Myers, a Deputy Administrator of the National Aeronautics and Space Administration, Brigadier General Robert Rankine, Director of Space Systems of the United States Air Force.

Mr. Myers, you have had an opportunity to be with NASA before in some earlier years, and now you're back as a Deputy Administrator, and we are glad to have you here.

General Rankine, I understand that you have another star coming if Senate ever gets around to handling the motion list, and we congratulate your advance on that second star, and we are delighted to have you here.

And Mr. Myers, we are going to call on you as our first witness and tell you that your statements in full will be placed in the record, and we hope you will give us an oral summary so that we will have time for questions. Thank you.

STATEMENT OF DALE MYERS, DEPUTY ADMINISTRATOR, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Mr. MYERS. Thank you very much, Mr. Senator. I'd like to just read a paragraph as an introduction and go into an oral summary of my statement.

I really appreciate the opportunity to appear before you to discuss the fiscal 1988 NASA budget and the steps which need to be taken to strengthen the U.S. Civil Space Program.

These steps, including rebuilding the Nation's Space Transportation System with a safe restoration of the Shuttle fleet, and the examination of options for expendable launch vehicle capability; deployment of the Space Station to be operational in the mid-1990's, the reinvigorating of the Space Science and Applications program, and the strengthening of NASA's research and technology base.

STRONG SPACE PROGRAM REQUESTED

President Reagan's fiscal year 1988 budget request for NASA provides for a strong space program conceived in an environment of considerable fiscal restraint. NASA's proposed budget meets the highest priority needs identified during the budget formulation process and provides an effective base for development of a full program to assure the United States' leadership in space.

It reflects the President's strong and continuing commitment to space and aeronautics programs, and to achieving a permanently manned presence in space in a Space Station in low Earth orbit.

The President has requested a NASA budget totalling $9.481 billion. On a comparable basis, this represents an essential increase over the $10.5 billion in our fiscal 1987 operating plan, because the 1987 plan included $2.1 billion to fully fund a replacement orbiter for the *Challenger*.

NASA's fiscal 1988 request includes $3.623 billion for research and development; $4.064 billion for space flight, control and data communications; $195.5 million for the construction of facilities, and $1.598 billion for research and development and program management.

REBUILDING THE SHUTTLE CAPABILITY

I would like to talk about our rebuilding of the Shuttle capability, first, Mr. Chairman.

It is our top priority item. The Shuttle program *Challenger* catastrophe created a tremendous effect in many, many areas of our space program. Because the Shuttle was the primary launch capability for this country, it affected all of our science programs, all of our communication satellite programs, all of our military programs, and probably had a far-reaching effect that will take years to understand fully.

Of course, in addition to this, we recognize we have been under great pressure in meeting the goals of the country in launching these various payloads, and had over-extended our capabilities within NASA.

We have now had the Roger's Commission recommendations and we have implemented all of those recommendations. We have reevaluated all of the critical items on the Shuttle. Many changes in the solid rocket motors, the space shuttle main engines, the orbiter, brakes, steering, other elements of the program have really been gone over absolutely thoroughly and in-depth, and changes have been defined and are underway in tests.

We have defined a crew rescue system that would rescue the crew from a gliding flight. We are in the unfortunate position in the Shuttle that it has many elements in its flight regime where there is no way to recover in case of an emergency. But, in those cases where we can, we are studying the means of doing that.

We have installed a new program management structure to improve communications and make sure that we have the continued up and down communications required in a massive program of this nature.

Our first flight is scheduled for February 1988, and at this moment we are still on schedule for that flight date. We have set up all of our test programs. We are underway in those tests. We have some threats to that schedule. We have, for example, a review done by a committee that has recommended that we have one more solid rocket static firing before we launch the Shuttle. We are reviewing the possibility of running what we call a flight readiness firing of the main engines in the Shuttle prior to flight. Those two elements, if they come into the program, or if any other items come into the program that appear to us to be of a safety nature, we won't hesitate to change that scheduled launch date.

I think that we have had the same schedule since June of last year, and as we look forward, we don't see any major threats. Perhaps, depending on how these things work out, we might have a few weeks delay.

MORE FLIGHT CAPABILITY NEEDED

The other thing that we are continuing to review in the Shuttle program is the flight rate. This becomes very important because of the tremendous backlog of payloads that are waiting to be launched. After the accident, we reviewed our capabilities in terms of flight rate for the Shuttle. And we had originally been planning for 24 flights a year. We now, after this review, set up a schedule which calls for a gradual increase starting with this first flight in February 1988, up to a level of about 16 flights per year by about 1993.

At the same time, we have had other committees recommend that we go to lower rates than that. In any case, whether we go to 16 flights per year or something somewhat lower than that, the backlog of payloads, both DOD payloads, NASA science payloads, even with taking the commercial communication satellites off the Shuttle, leaves us with a backlog that just desperately needs more flight capability.

The fourth orbiter is absolutely vital to that program. Without it, we think it would be a tremendous degradation of launch capability in this country that just could not be handled.

So, to us, the backlog of payloads that are involved in both science and military programs, even though we are bringing expendable launch vehicles into the picture, leaves us with a shortage of robust capability that leaves us always off balance in terms of planning the next flight, scheduling other payloads, being able to be flexible in handling the requirements of this country.

I think, in general, we are back on track in the Shuttle. The jobs have been defined, work is underway, people's morale is up, here in KSC we have just begun to do a little bit of the hiring back to get ready for our flight rates on the Shuttle. We expect, within the next 10 months, getting ready for the flight next year, to bring well over a thousand people back on line here in our NASA programs, and gradually build up as the flight rate builds up to a level above that.

SPACE STATION KEY TO FUTURE

Let's talk now about the Space Station. We think the Space Station is absolutely the key to the future of our leadership in space of the United States.

We are deeply involved with international activities in that program. It is a key to commercialization in space, not for the commercial launch vehicles but for the use of space for commercial activities, such as the microgravity activities of growing gallium arsenide chips for electronic devices and the idea of growing almost perfect protein crystals for understanding life sciences. The Space Station is also a place where our large observatories can be serviced, instruments can be changed, updated, brought up to speed.

Devices such as the Hubble Space Telescope which have greatly increased the volume that we can look in the universe by a factor of 350 is going to be a very complex, very important and very long duration observatory in space.

The Space Station is the place where we can do maintenance, repair and update of that device.

We see other observatories coming into the inventory to cover other spectrums of the universe's electromagnetic frequency. And those devices, too, will be serviced by the Space Station.

The Space Station is also the base from which we will assemble devices to go to other orbits, geosynchronous orbit or exploration into deep space.

Jim Fletcher, for whom I have the greatest admiration, is a man who thinks ahead. And he is doing now a very thorough systems review of the opportunities that are available to the United States in the future in space. The very things that you spoke of, many small things, one large thing. What is it really that we ought to have as our visions for the space program?

There have been some very good studies done over many years in this area. The latest being the President's Commission run by Tom Paine. And we are reviewing those options and others to determine our view of our vision of the future of space in the civilian space program.

So, that program is fundamentally tied to the Space Station. The Space Station is a basic building block for any of these future elements of space we look forward to.

COST HIGHER THAN ANTICIPATED

Now, one of the problems with the Space Station is we found that the cost is higher than we had anticipated it to be 3 years ago when the program started. We are looking at opportunities to modify the configuration, or to find other ways to reduce its cost to recognizing certain problems we have in the Federal deficit in the country, and the problems in budget. We think, as you do, that the Space Station is absolutely the key, and we must find a way to move forward with it.

We are working very hard at that. We expect to bring our views of that to the Congress very shortly.

PAYLOADS DELAYED 3 TO 4 YEARS

In science and applications, as I said earlier, it is a terrible blow to the science of our country what happened in the *Challenger* accident. It delayed for periods of up to 3 or 4 years many of the important payloads that we had. The United States is clearly ahead of the rest of the world in their science and planetary exploration activities.

We will probably still be ahead when we recover and the Space Shuttle is back in business. But it certainly is a part of trying to find how to work around those problems. We are working very hard and looking at other ways to launch these vehicles to solve that terrible backlog of time that has come into the program.

We are looking, therefore, at the idea of using expendable launch vehicles to help us in our planetary programs, particularly. We are working very closely with the Air Force and with the industry looking at launch vehicles that might be available in the next 5 years that could help us in this very difficult problem we are having with science payload.

And you can imagine a graduate student who's been working on a science project, finding his payload has been delayed for 3 years; a man who is getting his Ph.D. working with grants perhaps with NASA, perhaps with the university, on a science project of this nature, then to find out his project had been delayed 3 or 4 years.

We imagine that, too. And we are doing a lot of work with these young people, and the university people, finding alternate ways to challenge their interest in space science and technology during the period that we are waiting for these payloads to get back on the Shuttle.

We are encouraging the use of balloon research. We have some facilities like in the KC135 where we can do Zero-G flights and do very quick tests on microgravities, for example. We have drop tunnels where we have vertical drops where we can have a test for a few seconds zero gravity.

Those are not the real answers, of course, but they do give people a chance to develop instruments and to get those instruments ready to fly again when the Shuttle is ready to go again.

GLOBAL GEOSPACE SCIENCE PROGRAM STARTED

In the 1988 budget, we have started a Global Geospace Science program which will investigate the physics of the earth's magnetosphere in a series of satellites, with an American satellite, and then some European satellites, all involved in a very complete understanding of the magnetosphere.

We have many other important payloads, Galileo, to go to Jupiter, the Mars Observer, which will go look at the atmosphere and the materials on Mars, an upper atmosphere research program to do more fundamental work on the atmosphere of the earth. We are going to launch a cosmic background explorer in 1989 on the Delta II rocket, the first of our new expendable launchers.

Finally, I wanted to discuss our NASA research and technology base, very key in my mind are the things you talked of, of getting young people involved in technology and stimulating young people to go into engineering and science.

Our NASA aeronautics research has been outstanding, I think, in the world. It is a world leader in activities associated with aircraft technology. Such things as winglets for commercial transports, the newest work on swept propellers to make major reductions in the cost of fuel for transport. All these elements, things like the area rule that's used on aircraft design are NASA technologies that have been very important to commercial and military aircraft.

AGGRESSIVE PROGRAM PROPOSED FOR SPACE PROGRAM

And that's going on, well-funded by Congress and continuing to be an important program. Where we kind of drop the ball, I think, is in our space technology, things associated with materials, propulsion systems, and the elements that are associated with space programs themselves, both in the science involved and scientific sensors for important probes in deep space, bi-planetary probes, and in the elements associated with the involvement of new launch vehicles and spacecraft.

We put a lot of energy into the Shuttle itself. That was an extremely important advance in technology. But it became a focused technology that was so strongly focused that we really began to drop away from some of the more exotic new technologies, the cutting edges for the next generation.

We found that we had dropped down very badly in that area. We have this year proposed $70 million to put a very aggressive program together on the space technology activities. And there is an area where new materials, new applications of artificial intelligence to our programs, new propulsion systems, all are the kind of things that really excite the young people and are the things that I think will give young people an understanding of the tremendously important and active technologies ahead of them in this country.

Our programs include a good balance I think. It is a pretty exotic kind of aeronautics programs now. We are doing an X-wing rotor, which is able to be fixed so that you have an airplane-like device made after a helicopter basically. We are doing the forward swept wing, which is forward instead of swept back. It has some very special high tech and high maneuverability capabilities. I mentioned earlier the high temperature composites and things of that nature we are getting into.

COMMERCIAL LAUNCH VEHICLE CAPABILITY GETS HELP

Now, I have woven into all of this discussion the problem of expendable launch vehicles. NASA had a policy 2 years ago that we would launch all of our devices on the Shuttle. That policy was changed by the President last year, and commercial satellites were removed from the Shuttle unless they were unique to the Shuttle. There are 24 commercial satellites, that were removed from the Shuttle manifest. Not nearly enough to reduce the backlog, by the way, but certainly a real blow to the commercial satellite people. They must find commercial launch vehicles to launch those vehicles. And it is stimulating now the commercial launch vehicle capability of the country.

The Air Force is—and I am sure General Rankine will mention this—really stimulating the industry too by bringing commercial launch vehicles into their inventory sooner than we have been able to bring them into ours. By doing that, they have started the production lines again, and that allows the industry to reduce the cost of launch vehicles and gives them a chance to break into the commercial launch vehicle market.

We are encouraging that in every way possible. We are helping the commercial satellite people get in touch with the commercial launch vehicle people. We are working with the commercial launch vehicle people to use our Government owned-facilities that have been built to launch those kinds of vehicles at cost so that there is no plus or minus as far as the cost of use of those facilities are concerned.

We have done that with General Dynamics for the Atlas. We are now in the final negotiation with McDonnell Douglas for the use of the Delta facilities that NASA owns. We are working with the Martin Marietta people on the Titan vehicle support facilities they use for their launches. We have worked out an arrangement with a company in Texas for launches. So, we are pressing to help the commercial launch industry get into business. We see it as an opportunity for the industry, and one that we are going to support as much as we can.

TECHNOLOGY UTILIZATION PROGRAM

I think that generally covers the sort of status of the various pieces of NASA's program. But I would like to say that, within the commercial area, we also have done some interesting things. I think NASA is ahead of most of the Government in a thing we call technology utilization program. It is the idea of transferring the technologies that NASA has developed into the industry. And we do it very seriously. We have done it for many years. We developed libraries of information. We developed agreements with universities to have people at the university be the interpreters of our technology to small industries so they can understand the kind of technologies we have available.

We have most recently worked an arrangement where we have centers of commercial space opportunities at several universities and private operations where the private industries put money into the group and we put some money into it. It gives a place for the grants to be given to university students and senior research people to work on things associated with the space program.

Most recently, one of the headlines in the newspaper was a breakthrough in superconductivity. That occurred where one of our commercial space center groups working with the National Science Foundation had jointly sponsored some work by a group at the University of Alabama and one other place, and I have lost where the other place is, where they did some work on superconductivity where they were able to get this tremendous low resistance or no resistance flow of electricity at temperatures higher than the temperatures of liquid nitrogen. Now, that's a tremendous breakthrough because they used to have to use helium to bring the temperature down to about 40 degrees above absolute zero. This means that nitrogen can be used in superconductivity and in special applications. I think this will be a tremendous break forward for this country.

Those are the kind of stimulating ideas that come from these little, relatively small, grants.

We put about a $1 million average into each of about nine centers around the country in that area. Those are the kind of things I think are going to be important to bring out new ideas, then to be spun off in the industry.

That concludes my statement, Mr. Chairman. I will be happy to answer questions.

[The prepared statement of Mr. Myers follows:]

Statement of

Dale D. Myers
Deputy Administrator

National Aeronautics and Space Administration

before the

Committee on Budget
United States Senate

Mr. Chairman and Members of the Subcommittee:

I appreciate the opportunity to appear before you to discuss the FY 1988 NASA budget and the steps which need to be taken to strenthen the U.S. civil space program.

These steps include rebuilding the nations space transportation system with a safe restoration of the shuttle fleet and examination of options for expendable launch vehicle capability; the deployment of the Space Station to be operational in the mid 1990's, reinvigorating the Space Science and Applications program; and strengthening the NASA research and technology base.

President Reagan's FY 1988 budget request for NASA provides for a strong space program conceived in an environment of considerable fiscal restraint. NASA's proposed budget meets the highest priority needs identified during the budget formulation process and provides an effective base for development of a full program to assure United States leadership in space. It reflects the President's strong and continuing commitment to space and aeronautics programs and to achieving a permanently manned presence in space with a Space Station in low Earth orbit. The President has requested a NASA budget totalling $9.481 billion. On a comparable basis, this represents an essential increase over the $10.5 billion in our FY 1987 operating plan, which includes $2.1 billion to fully fund a replacement orbiter for Challenger. NASA's FY 1988 request includes $3.623 billion for Research and Development, $4.064 billicn for Space Flight, Control, and Data Communications, $195.5 million for Construction of Facilities, and $1.598 billion for Research and Program Management.

In FY 1988, we will continue to give top priority to returning the Shuttle to flight status and rebuild the Nation's space transportation system. We have taken a number of steps to restore the Space Shuttle to safe reliable flight. We have accepted and implemented the necessary changes required for a safe return to flight recommended by the Presidential Commission which investigated the Challenger accident. We have conducted a thorough re-evaluation of all critical flight hardware and have identified and scheduled the changes that must be completed before first flight in the solid rocket boosters (SRB's), space shuttle main engines (SSME's), orbiter flight hardware/software and launch complex ground support equipment. We have conducted a crew egress and escape system study and have initiated a modification which will enhance crew safety. We are also making a complete review of the total mission profile, which includes pad activities, launch to orbit, and descent to landing. Finally, we have put a new management structure in place which will ensure improved program communications and management of the Space Transportation System (STS). The Office of Space Flight has been reorganized consistent with the strengthening of the NSTS program.

We have made significant progress in the activities required to ensure the safe return of the Shuttle to flight, and have targeted the first flight for February 1988. While we are planning to that date, there are threats to meeting that schedule. We are making good progress currently and our assessment is that the target date is achievable. However, I assure you that if we have any concerns about safety or there are any unforeseen problems, we will not hesitate to make the necessary schedule adjustments and change the flight date.

When we resume flying, shuttle performance will be initially limited to 55,000 pounds to low-Earth orbit from KSC and 21,200 pounds from the western test range, excluding mission reserves of 3500 pounds. Landing weight is presently limited to 50,800 pounds. However, we expect that a comprehensive loads analysis now being conducted will permit an increase to 58,000 pounds in the near future. We are examining evolutionary improvements to attain the performance equivalent to that planned prior to the accident.

An assessment of a safe sustainable NSTS flight rate capability has been completed by both the National Research Council (NRC) and the NASA STS Flight Rate Capability Working Group. With a four orbiter fleet, the NRC estimated the maximum sustained flight rate is between 11 and 13 flights per year. The NASA study estimated 14 to 16. The NASA planning goal flight rate builds up to 16 flights per year from KSC in 1993. This will be re-examined after we have resumed Shuttle flights and gained additional experience with Shuttle operations.

We have authorized replacement orbiter production planning and critical subsystems procurements in order to effectively start production in August 1987 with delivery in the spring of 1991. These efforts will allow us the opportunity to get the maximum benefit to the Nation through an early utilization of the orbiter to help fly off the large backlog of critical missions resulting from the Challenger accident.

We continue to provide launch services to reimbursable government customers on the Scout, Delta, Atlas, and Atlas Centaur. As you know, we are also reviewing options for the use of expendable launch vehicles (ELV's) for some NASA science payloads. NASA initiated a study to determine the viability of a mixed fleet capability to launch approved/planned NASA and civil missions during the "near term" (1987 to 1992) and are continuing to study the "far term" (1993 to 2000). The preliminary results of this study clearly indicate that an unmanned expendable launch vehicle (ELV) capability is required to augment the National Space Transportation System. Further asessment of requirements for Space Station assembly and logistics, as well as other needs for a heavy lift launch vehicle, must be completed prior to a final decision on a total mixed fleet implementation plan.

There are some steps that can be taken now, however. We recently initiated procurement activities for a Delta vehicle to launch the NASA Cosmic Background Explorer (COBE) mission in early 1989. We have also identified candidate payloads of the Titan III/IV classes that are under consideration for ELV launches in the period through 1991. These include TDRS-E & [illegible], Mars Observer and two explorer missions ROSAT and CRRES.

We are in the process of establishing a joint NASA/DOD reimbursement policy, including a quid-pro-quo agreement, that will support their use of the STS and our use of their Titan (CELV) and Delta (MLV) vehicles.

We support the President's policy on the commercialization of expendable launch vehicles and NASA is proceeding to transfer authority to the private sector to use NASA-controlled facilities and capabilities for commercial launchings. We have signed an agreement with General Dynamics to privatize the Atlas-Centaur and are currently negotiating with McDonnell-Douglas on the terms of privatizing the Delta vehicle.

An agreement with Space Services, Incorporated, was signed in 1986 allowing use of NASA facilities for the launch of the privately developed Conestoga vehicle. Martin Marietta has requested an agreement for use of NASA facilities in support of their commercial Titan program. They are currently reviewing a draft agreement which NASA provided them in December 1986.

Today's U.S. space launch systems lack sufficient payload lift capability, operational flexibility and operating economy to meet national space launch goals in the late 1990s and into the next century. While the Space Shuttle, current expendable boosters, and boosters now in development (Titan IV and Delta II) will be the workhorse systems for the near term, both civil and military needs in the longer term will require new launch capabilities.

Early in 1985, the President directed DOD and NASA to jointly study the development of next-generation space transportation systems. In September 1985, in response to the President's direction, the DOD and NASA initiated a joint Space Transportation Architecture Study (STAS). Study completion is scheduled for the end of 1987.

The STAS is examining space transportation requirements for a wide variety of potential space missions over the next 25 years. Potential mission scenarios range from a continuation of current national security and civil missions at a constrained level to cases with substantial expansion such as a full Strategic Defense Initiative (SDI) deployment or an aggressive civil space manned exploration program as proposed by the President's National Commission on Space. The level of space activities is projected to grow significantly over the next 25 years. With that growth comes an increasing demand for reliable, cost effective access to space, and a potential need for much greater launch capcity. Space Missions are expected to grow in their diversity, increasing the need for operational flexibility and requiring new capabilities, such as servicing and maintenance. Current space transportation systems lack the low operations costs, operational versatility, and capacity to meet these future needs.

The STAS is considering both manned and unmanned systems and a full range of options including newly designed future systems as well as one derived from today's systems. Architecture studies to date indicate that future needs can be best met with a mixed fleet of manned and unmanned launch vehicles and orbital transfer stages based on advanced vehicle and operations technologies.

Although the study is not complete, preliminary results favor the development of an unmanned, partially reusable cargo launch vehicle to provide cost effective heavy launch capacity, followed by a new, fully reusable manned vehicle as a post-2000 Space Shuttle replacement providing both up and down mission capability and reusable orbit transfer vehicles. This mixed fleet must provide reliable cost effective space transportation for a wide variety of space missions well into the 21st Century and would be capable of capacity expansion to meet the demands of civil and national security missions.

We expect that NASA's involvement would include aspects of selection, development and use of a heavy-lift vehicle and the next generation manned transportation system. These activities will encompass our long heritage in the development of large launch vehicles and their engines, as well as manned spacecraft, the R&QA principles and practices required for manned systems and as required, test facilities for booster structures, engines and spacecraft. We anticipate that the earliest requirement NASA would have for a heavy-lift vehicle would be 1993. The studies and analyses we are conducting with the DoD to define our next generation systems must be completed expeditiously to support future decisions on new transportation options. We believe that it is important that existing proven technologies be utilized where practical and that opportunities offered by advanced technologies be understood and that the most promising technologies be identified and developed.

The Administration continues to place a high priority on the development of a permanently manned Space Station, and NASA's FY 1988 budget request of $767 million for Space Station supports substantial and steady progress in meeting the President's goal of an operational capability in the mid 1990s. The Space Station is essential to regaining a position of leadership in space for the United States. Its practical benefits will be many -- it will be an orbiting laboratory for the conduct of science, the development of new technologies, and the stimulation of commercial enterprises. It will provide a facility in space to service and repair spacecraft. It will function as a transportation depot from which spacecraft can depart to geosynchronous orbit and beyond. The lessons learned from operating the Space Station in the 1990s -- in life sciences, microgravity sciences, technology, and assembly of large structures -- are necessary prerequisites to any future long-duration manned exploratory mission.

Symbolic values of the Space Station, however, may exceed its considerable practicality. It represents the commitment of the United States to a future in space. This future will be intellectually rigorous, technically demanding, and commercially profitable. With the positive response to President Reagan's invitation to friends and allies of the United States to participate in the program, the Station symbolizes our Nation's desire to cooperate with others in mutually beneficial civil space activities. With the Soviet Union already operating two orbiting stations, the Space Station symbolizes the intent of the United States to be second to none in utilizing the diverse capabilities of a permanent human presence in space. Perhaps most importantly, as we steadfastly recover from the loss of Challenger and her crew, the Space Station symbolizes our national determination -- shared by the President, the Congress, and the American public -- to remain undeterred by the tragedy and to continue to explore the frontiers of space.

The Space Station Program itself, in the past six months, has made substantial progress, and I am confident we are now on the right track. We have completed an extensive, 21-month definition and preliminary design study, supplemented by a critical evaluation of the Station's configuration conducted by a special NASA task force. We have completed a three-year effort in technology development, extensively examined operational factors, and restructured the Program's management. In response to Congressional directives, we have baselined a man-tended capability early in the assembly process, provided for the accommodation of early payloads, and initiated a flight telerobotic servicer program. We have also studied the related subjects of Space Station safety and crew rescue, involved the user communities in design activities and made progress in the international negotiations which will define the Space Station partnership during hardware development and operations. In addition, we are evaluating the results of an intensive top-to-bottom review of Space Station estimated costs based upon the revised configuration to assure that the program and funding plans are fully consistent. For further confidence, we are proceeding with both an independent program review and cost review. The result of all these activities should be a sound Space Station configuration and a solid understanding of design issues, which will enable NASA to undertake a successful development program.

In Space Science and Applications, NASA's budget continues to develop major projects to study the Earth, the solar system and the universe. Although the Challenger accident has delayed the launch of many scientific missions, their importance to science and to the expansion of human knowledge remains unquestioned, and they will be launched as expeditiously as possible, consistent with our capabilities. Furthermore, we have developed a strategy to carry the Space Science and Applications program through the hiatus in Space Shuttle flights in a manner which will ensure the maintenance of the science base and the continuation of the first class science which has been the hallmark of NASA. Because of the diminished frequency of Shuttle launches, particularly in the early years of resumed flight, we are carefully considering the options for recovery of the Planetary Program. We will launch each mission as soon as practically possible consistent with vehicle availability. The FY 1988 request of $1508.3 million will provide necessary support to accommodate replanning of major flight projects and smaller payloads under the revised Shuttle manifest. It will ensure maintenance of our critical research base which will provide for exploitation of already operating missions as well as analysis of data from previous missions. The FY 1988 request also supports initiation of efforts to prepare for the Space Station era which is expected to increase the potential for scientific advances many fold; the initiation of the funding in this budget will ensure that we are in a position to make maximum use of the Space Station in the early stages.

The FY 1988 budget supports a viable program of science across the various disciplines, with many international partners. It provides for continued effort on the Hubble Space Telescope, scheduled for launch from the Shuttle in 1988; the telescope will enlarge the volume of the universe viewed by 350 times and will extend our vision back ten billion years, almost to the birth of the universe. It also supports continued development of other major projects, including the Gamma Ray Observatory; the Magellan mission to Venus, the Galileo mission to Jupiter, the Mars Observer, the Upper Atmosphere Research Satellite and the Ulysses Solar Observatory. The Cosmic Background Explorer, which will study the radiation from the birth of the universe, is scheduled for launch in 1989 from Vandenberg Air Force Base on a Delta rocket, which will enable launch of this most important scientific spacecraft only nine months later than planned prior to the Challenger accident. This budget also provides for the resumption of Spacelab missions in early 1989.

The budget includes $25 million for the Global Geospace Science Mission, which will support the full participation of the United States in the International Solar Terrestrial Physics (ISTP) program, an important cooperative effort with the European Space Agency and Japan. The program will involve the launch of a series of spacecraft beginning in 1992 and operating through the decade, to study the basic physics of the Earth's magnetosphere and solar terrestrial relationships. The program will entail the most comprehensive study of the Earth's magnetosphere ever attempted and will increase our understanding of how incoming energy from the Sun is distributed, stored and released.

In recent years, considerable concern has been expressed in Congress and elsewhere that this Nation may be, in effect, mortgaging its future in space by living off past technological achievements. In order to continue to ensure United States leadership in space technology, ongoing technology efforts in NASA's FY 1988 Space Research and Technology Program have been augmented by $70 million as part of a new Civil Space Technology Initiative (CSTI). The CSTI will begin a major new effort to strengthen the Nation's technical base and thereby its competitive posture, as well as to rebuild and restore NASA's technical strength. The program will be implemented in close cooperation with industry and with expanded university involvement. It includes research in technologies for safe and efficient access to space, for Earth-orbiting operations, and for supporting science. In transportation, launch vehicle propulsion research will be aimed at reusable, high-performance engines for next-generation vehicles, a new booster technology program will develop options for both liquid rocket hybrid and propulsion systems, and an aerobraking flight experiment will demonstrate use of the atmosphere to slow a vehicle returning to Earth orbit at high velocities. Earth-orbiting operations capability will be enhanced through a continued and expanded effort in automation and robotics. Applications include autonomous systems for control of multiple subsystems in the Space Station, launch system software to replace routine, labor-intensive activities, robotics for remote assembly, repair and servicing of space vehicles, and high capacity power delivery. Supporting technology for science will include efforts in structures research, sensor research for Earth observations and astrophysics, and data research for onboard processing of imaging information. CSTI is an important first step in sustaining United States industrial competitiveness and leadership in space.

Our program of Aeronautics Research and Technology is focusing on emerging technologies aimed at maintaining U.S. leadership in aviation and enhancing U.S. industrial competitiveness. The FY 1988 NASA request for this program is $375 million. During the past year, the X-29 forward-swept wing completed the initial flight envelope expansion; industry began flight tests of the GE/NASA Unducted Fan engine; and significant progress was made in joint research with the Federal Aviation Administration addressing wind shear and collision avoidance systems. This year, flight testing will begin on an advanced high-speed turboprop and the X-wing research aircraft. In FY 1988, emphasis on our computational research will lead to advances in the design of aircraft and propulsion systems with the new Numerical Aerodynamic Simulation capability that is now on line at the Ames Research Center. Also, promising results are expected in research aimed at highly maneuverable aircraft technology and high-temperature composite engine materials -- materials that promise revolutionary advances in engine thrust-to-weight ratio and efficient supersonic cruise propulsion systems. In the still higher speed regime, we will continue with the development of technology for hypersonic and transatmospheric flight in support of the National Aero-Space Plane program. Particular emphasis is on lightweight thermal structures, high-speed propulsion, and development of the computational tools necessary for vehicle design and integration.

NASA is very grateful for the support from Congress and especially from you Chairman Chiles, your Ranking Member, Senator Domenici, and for the support it has received from the Congress as a whole as well as from the American people. Today, more than ever, NASA is determined to be worthy of that support. With renewed dedication to excellence, we will strive to make America proud and to maintain our leadership in aeronautics and space. The American people deserve and expect no less.

Mr. Chairman, this completes my prepared statement. I would be pleased to respond to questions you and other Members of the Committee may have.

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Chairman **Chiles**. Thank you, sir. I want to hear from General Rankine first, then I'll ask questions.

General Rankine?

STATEMENT OF BRIG. GEN. ROBERT RANKINE, DIRECTOR OF SPACE SYSTEMS, U.S. AIR FORCE

General **Rankine**. Thank you, Mr. Chairman. It is indeed a pleasure to be here to testify regarding the DOD's space launch recovery plans.

I think I ought to begin by thanking you, Mr. Chairman. You are not only chairman of this committee, but you are also a member of the Senate Appropriations Committee. And it is prompt action by the Appropriations Committee on the DOD's Urgent Supplemental for 1986, and Budget amendment for 1987 which has enabled us to move out on that program so that I can tell you about it today.

I have the formal statement which I would like——

Chairman **Chiles**. Your formal statement will be prepared and placed in the record.[1] We would appreciate your brief summary.

General **Rankine**. Thank you, sir.

I brought a few charts along to help illustrate some points.

Given that a picture is worth a thousand words, I thought it perhaps might be better illustrated to you if I characterize my remarks with some pictures.

NATIONAL SECURITY OBJECTIVE AND STRATEGY

- OBJECTIVE
  —ENSURE A MORE CAPABLE LAUNCH POSTURE THAN BEFORE CHALLENGER FAILURE
- STRATEGY
  —NEAR-TERM: NO SINGLE NODES OR PATHS
    - LAUNCH VEHICLES
    - LAUNCH FACILITIES

  —FAR-TERM: THE ABOVE PLUS SIGNIFICANTLY LOWER COST

Let me begin by setting the objective of the DOD space launch recovery program.

I think you have heard testimony in the past from the Air Force, Department of Defense and from NASA which has said that our objective is to emerge from the time of the *Challenger* accident and the time of the Titan accident with a more robust, substantial capability than we had actually before we entered it—to be better than we were in the past.

ASSURED ACCESS OF SPACE

What that means to us in the Department of Defense is what we call assured access to space. And assured access to space is a strategy by which we acquire launch vehicles and launch facilities and launch support capability so that there is no single road or single path to space—so that we always have an alternative for critical national security payloads.

In the far term, we expect to follow that same approach—assured access to space—by having at least dual capability to put payloads into orbit. But in the far term we would like to do that at a far lower cost than we are able to today. And what I would like to do for you is to briefly summarize our DOD space launch recovery plans in three parts.

First of all, the near term, which deals with how do we recover from the impact of recent accidents? Secondly, in the mid-term, how do we acquire expendable launch vehicles to offset the down time that the Shuttle has caused and bring into production expendable launch vehicles very quickly. Finally, in the far term, I will address the future heavy lift launch vehicle and the replacement for the Shuttle, and how these provide a means for low cost access to space in the future.

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RECAP OF RECENT LAUNCH PROBLEMS

- TITAN 34D-7 FAILURE—AUGUST 1985
    - —CAUSE: STAGE 1 PROPELLANT FEED SYSTEM FAILURE
    - —LIQUID MOTOR PROBLEMS SOLVED: 11 FEB 87 WITH TITAN III/34B LAUNCH
- CHALLENGER ACCIDENT—JANUARY 1986
    - —CAUSE: SOLID ROCKET BOOSTER JOINT FAILURE
    - —NASA PLANS TO RESUME LAUNCHES FEB 88
- TITAN 34D-9—APRIL 1986
    - —CAUSE: SOLID ROCKET MOTOR CASE INSULATION DEBOND
    - —PAD REPAIR COMPLETE
    - —NONDESTRUCTIVE TESTS DEVELOPED: RESUME LAUNCHES IN 1987
- SHUTTLE CENTAUR TERMINATION
    - —CAUSE: SHUTTLE SAFETY CONCERNS
    - —AIR FORCE PURSUING DUAL-COMPATIBLE HIGH-ENERGY UPPER STAGE
- IMPACT: 10 DOD PAYLOADS—7 1/3 MISSED LAUNCHES

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Let me summarize very briefly the accidents of the past that have put us into the precarious position that we are in today with respect to access to space.

First of all, we had a launch failure of the Titan 34D, vehicle number VII, back in August 1985. That was attributable to a problem in the liquid core engine. We have exonerated that particular problem, and have had a successful launch back on the February 11, 1987 of a Titan 34B vehicle. This launch proved that we had indeed corrected the problem with the liquid core engine. The Challenger accident in January 1986 was caused by the solid rocket booster joint failure, as Mr. Myers has testified. NASA plans to resume launches of that in 1988.

We had a subsequent failure of the Titan 34D from the west coast in April 1986. This time the cause was the solid rocket motors as opposed to liquid core engine. Because the failure occurred so soon after launch, the debris fell back onto the pad, destroying the pad and the adjacent pad. We have completed the repairs of both of those pads at the present time, and we have instituted new nondestructive testing so that we can clear the solid rocket motor segments prior to launch, and avoid a recurrence of this particular type of failure.

One by-product of a more conservative approach to the use of the Shuttle in the future was the cancellation of the use of the Centaur upper stage on the Shuttle. That has an impact on the Department of Defense because that prohibits us from launching our heavier payloads in the 10,000 pound class to the synchronous orbit.

NEW UPPER STAGE PURSUED

As a result of that, we are pursuing an upper stage which we will be able to fly safely on the Shuttle, and again give us dual access to space using the Shuttle for those heavier synchronous payloads, as well.

The overall impact on the Department of Defense of the Titan and the Shuttle accidents today has been that, Department of Defense payloads are not now in orbit that would have otherwise been in orbit today. Those payloads, some of them were mixed with other payloads and multiple payloads on a single launch, amount to 7⅓ missed launches.

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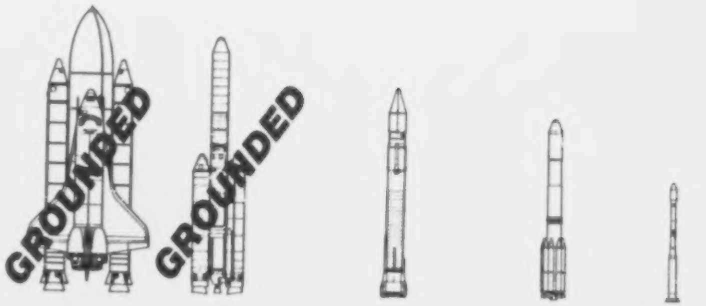
CURRENT LAUNCH VEHICLE ASSETS



LAUNCH VEHICLE:		SPACE SHUTTLE	TITAN 34D	ATLAS	DELTA	SCOUT
INVENTORY:		3	6	14	1	10
PAYLOAD TO ORBIT (LEO)	KSC:	65,000 LB	32,900 LB	3,000–13,500 LB	7,600 LB	570 LB
	VAFB:	28,000 LB	27,600 LB	1,750–2,600 LB	5,500 LB	460 LB

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So, this is the status of where we are today, Mr. Chairman. The two heaviest lift capabilities of the United States offered by the Shuttle and the Titan 34D are presently grounded. The remaining capability for the Department of Defense is represented by the Atlas, the Delta and the Scout Boosters, but I think you can see the imperative nature of getting a heavy lift capability restored.

Lets return very quickly to the mid-term. The mid-term recovery program has been enabled primarily by the urgent supplemental and the budget amendment that I mentioned previously, and has led us to a position where you see that this will be our space launch capability for DOD for the future. And for us the future begins, I think you can see from this chart, in 1988. If the Shuttle resumes its flights in February 1988.

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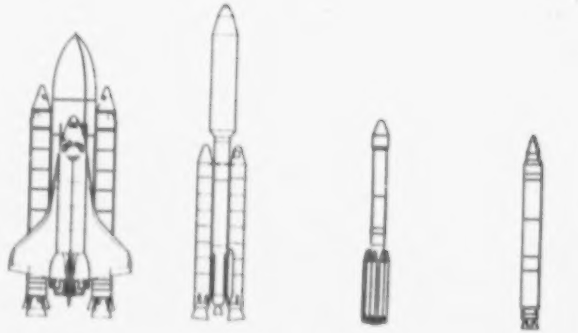
RECOVERY LAUNCH VEHICLES



LAUNCH VEHICLE:		SPACE SHUTTLE	TITAN IV	DELTA II	TITAN II
PAYLOAD TO 100 NM:	KSC	TBD (51-58K LB)	39,100 LB	11,400 LB	5,200 LB
	VAFB	—	31,500 LB	—	4,200 LB
AVAILABILITY DATE:		1988 (1992 FOR 4TH ORBITER)	1988	1988	1988

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Chairman **Chiles**. The mid-term looks a lot better than near term.

General **Rankine**. Yes, sir, it certainly does.

The Titan IV should become available in October 1988, initial launch capability. The Delta II, which we will use to launch our GPS satellites, will also be available in October 1988. In addition the Titan II which is a refurbished version of those old ICBMs we were pulling out of the silos, will now be used as space launch vehicles. The first of those will become available in April 1988. We'll use those primarily to put weather satellites into polar orbit.

LAUNCH BASE STRATEGY

- KENNEDY
  - —2 SHUTTLE PADS
  - —1 TITAN IV PAD (ILC 1988)
  - —1 TITAN 34D PAD (THROUGH 1989)
  - —2 DELTA II PADS (ILC 1988)
- VANDENBERG
  - —1 SHUTTLE PAD (FACILITY CARETAKER STATUS)
  - —2 TITAN IV PADS (ILC 1989/1993)
  - —1 TITAN II PAD (ILC 1988)

LAUNCH PADS TO BE UTILIZED

When we look at the launch vehicle status, then you have to complement that with a fully redundant launch base strategy that also permits access to space.

We have, of course, on the east coast here at Kennedy Space Center and at Cape Canaveral Air Force Station, combined two Shuttle launch pads and the Kennedy Titan IV pad, which we will be modifying to begin initial launch operations in October 1988.

The Titan 34D pad will be used for our Titan 34D launches through 1989, and then we will no longer have any use for that from a DOD perspective.

But we have indications from Martin Marietta they plan to offer commercial launch capability, and I'm sure that they want continued use of that pad.

In addition to that, we are in the process of modifying complex 17A and B at Cape Canaveral Air Force Station to accommodate the new Delta II launch vehicle. That will be the system that we used to begin putting the GPS satellites into orbit.

That also has a possibility of being used for commercial launches as well as DOD and NASA.

At Vandenberg on the west coast, we have one Shuttle pad which we have recently begun to move into what we call facility caretaker status. What that means is that it would take us about 4 years from the decision to re-activate before we could launch from the west coast.

The reason for that is to get maximum utility out of the three remaining orbiters out of Kennedy Space Center until such time as the performance of the Shuttle and requirements dictate that we open that facility for Shuttle launches on the west coast.

In the meantime, we have begun with the construction of a pad on the west coast to match up the initial launch capability for the Titan IV in 1989. And in this President's budget, we are requesting the beginning of a second Titan IV pad for the west coast to begin initial launch capability in 1993.

We also are creating a Titan II pad to match up with the Titan II's capability in April 1988.

COMMERCIAL SPACE LAUNCH

- HEALTHY COMMERCIAL SPACE LAUNCH INDUSTRY AIDS NATIONAL DEFENSE
  - —SPACE MORE ACCESSIBLE
  - —SPACE MORE AFFORDABLE
- ENCOURAGE INDUSTRY
  - —RESTRICT USE OF STS IN COMMERCIAL LAUNCH MARKET
  - —PROVIDE INCENTIVE FOR COMMERCIAL APPLICATION OF AIR FORCE MLV BOOSTER (DELTA II)
  - —ALLOW COMMERCIAL USE OF DOD FACILITIES ON DIRECT-COST BASIS
  - —WAIVE RECOUPMENT OF GOVERNMENT-FUNDED DEVELOPMENT COSTS
- GOVERNMENT/INDUSTRY SYMPOSIUM

DOD SUPPORTS COMMERCIAL SPACE LAUNCH INDUSTRY

I think it is worth mentioning the DOD's support for the commercial space launch industry. This stems from two fundamental principles. First the commercialization of space launch will make space more accessible to DOD's and the Government's uses, as well as for the commercial enterprise. And secondly, it will make space more affordable because we will be spreading the infrastructure of the investment more widely.

The administration has encouraged the creation of a space launch industry. As Mr. Myers has already pointed out, we have restricted the use of the Shuttle in commercial launch markets so that the Shuttle will not directly compete with commercial enterprises. Also, NASA and DOD are jointly be participating in what we called the Space Transportation Architecture Study. We use the abbreviation STAS.

STAS FOCUSED ON LOW COST

The Space Transportation and Architecture Study has focused upon achieving low cost assured access to space for the Nation in the future.

And low cost access to space means not only perhaps a new generation of vehicles, but it means a new infrastructure as well for logistics and space launch operations and payload processing.

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STAS DEVELOPED INSIGHTS
A GENERIC ARCHITECTURE

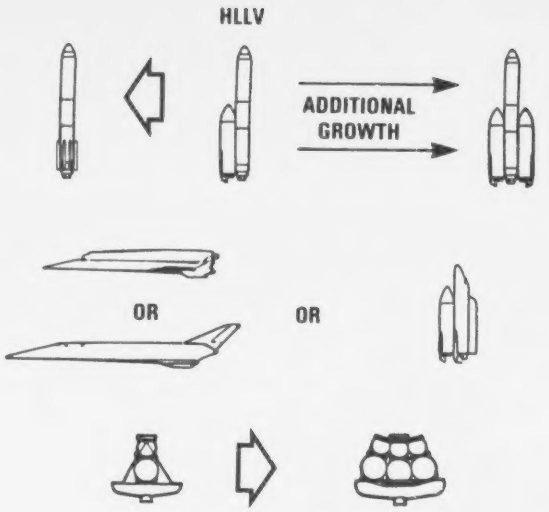
OPTIMIZE TOTAL SYSTEM FOR LOW-COST OPERATIONS: MISSION CONTROL, LOGISTICS, OPERATIONS, AND VEHICLE

VEHICLE ELEMENTS:

UNMANNED, MODULAR, CARGO VEHICLE FAMILY (30-100K, 160K, 300K)

MANNED VEHICLE (40-65K)

REUSABLE OTV AS SOON AS TECHNOLOGY WILL ALLOW



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But just looking at the vehicles, this is what the Space Transportation Architecture Study has thus far recommended.

First of all, sometime beginning in the mid-1990s, it would be cost effective for the United States to begin using a heavy lift launch vehicle that could place a payload into orbit at much less cost. We believe that the heavy lift launch vehicle elements of it could be available even as soon as the early 1990s and might be beneficial to NASA in putting up the Space Station, for example.

From the manned vehicle perspective, the main thing we have to do is prepare ourselves to replace the Shuttle fleet. And it begins to reach the end of its useful life beyond the year 2000. And to do that, since we don't have to make a decision until about the mid-1990s, the main thing we need to do is to invest in the proper technologies now so we can make an informed decision about what that next generation manned launch vehicle should be. To do that, we have the National Aero-Space Plane program, which has incentivized our investment for air breathing access to orbit.

NASA and the Air Force are pursuing rocket technology. And the next generation vehicle might very well be rocket, it might be air breathing, or it might be a combination of the two.

Finally, with respect to low cost access to space and our ability to use payloads at the higher energy orbits, such as geosynchronous, this will be facilitated by our reusable orbital transfer vehicle. Once placed in orbit, it will be able to take payloads from the earth orbit of the heavy lift launch vehicle or the manned system up to the higher orbits, and then return and be able to be refueled.

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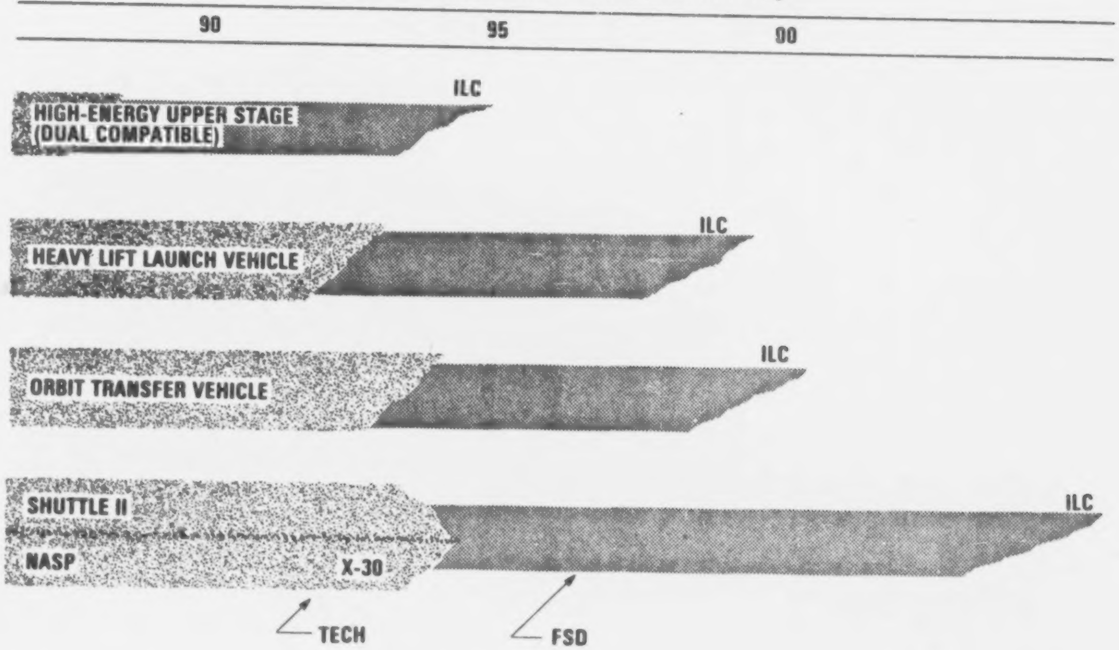
SPACE TRANSPORTATION TECHNOLOGY/ SYSTEM DEVELOPMENT

(WITHOUT SUPPLEMENTAL)



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Back in December, the Department of Defense and NASA had viewed the future in this way. The left-hand side of all of these bars represents the technology investment, and the right-hand side represents the full-scale development program.

TECHNOLOGY INVESTMENT

You will notice that for today's President's Budget recommendation, in all of these cases we are talking about technology investment. The high energy upper stages is being pursued by the Air Force, as I mentioned, to provide a safe capability for upper stages to take Shuttle payloads to geosynchronous orbit. The heavy lift launch vehicle, the orbit transport vehicle, and technology in both rocket and air breathing technology for the future are current investments.

You will notice on the heavy lift launch vehicle here that our original plans called for beginning full scale development in the early 1990's, leading to a late 1990's additional launch capability.

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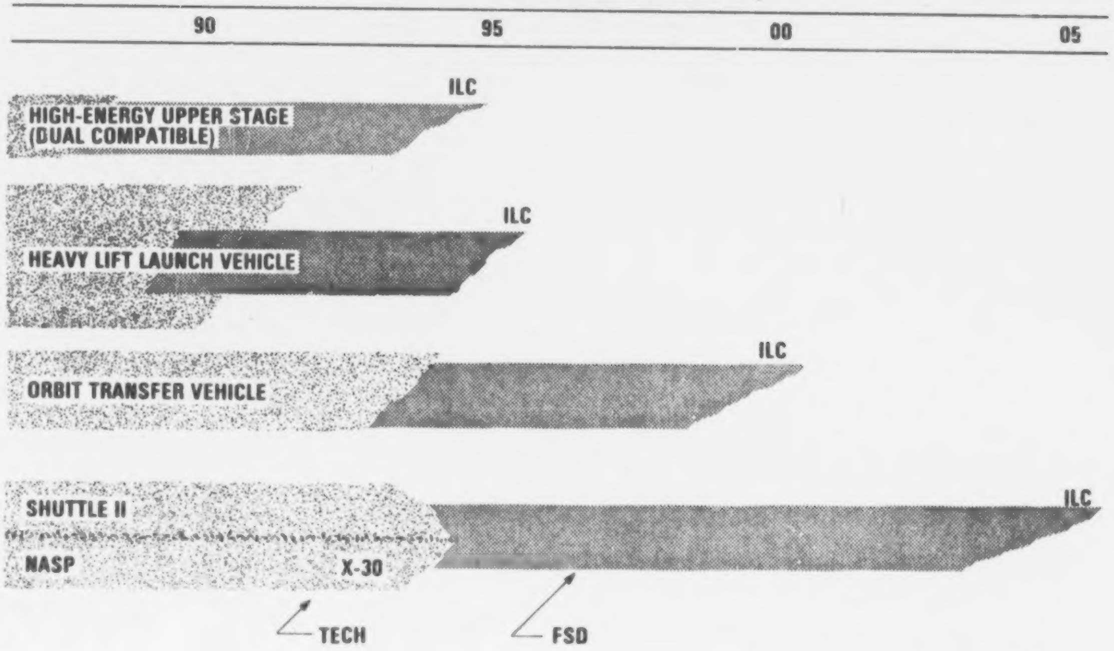
SPACE TRANSPORTATION TECHNOLOGY/ SYSTEM DEVELOPMENT

(WITH SUPPLEMENTAL)



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The President just recently submitted a 1987 supplemental for the Department of Defense. And within that is increased funding for the technology and for the beginning of concept exploration for the heavy lift launch vehicle. We believe that with that added investment, we will be able to move that heavy lift launch vehicle availability back to the mid-1990's and perhaps make the core vehicle available in the 1993-94 time period.

Chairman CHILES. I'm delighted to see the Air Force's interest in the heavy lift vehicle. I, some 2 years ago, talked to the Air Force about trying to do that. And, at that time, there was no interest.

General RANKINE. Well, sir, it looks to us like the mission model for the mid-1990s is such that we do need to have additional launch capability, whether it is for Air Force missions, SDI missions, NASA Space Station, or whatever. And I think it is to our benefit, to the Nation's benefit, to get on with lower cost access to space for that time period.

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CONCLUSION

THE AIR FORCE, NASA, AND SDIO ARE WORKING COOPERATIVELY TO IMPLEMENT A BALANCED PLAN FOR ASSURED ACCESS TO SPACE FOR DOD, SCIENTIFIC, AND COMMERCIAL MISSIONS

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Sir, I would like to conclude with this chart. It says, the Air Force, NASA, and the competing commercial organizations are cooperating to provide assured access to space, not only for the near term, but for the future as well.

Thank you very much.

[The prepared statement of General Rankine follows:]

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE COMMITTEE ON BUDGET

UNITED STATES SENATE

MARCH 1987

SUBJECT: Space Launch Outlook

STATEMENT OF: BRIGADIER GENERAL ROBERT R. RANKINE
Director of Space Systems and Command, Control and Communications
Deputy Chief of Staff
Research, Development and Acquisition
Headquarters USAF

MR CHAIRMAN AND MEMBERS OF THE COMMITTEE:

Slightly over one year ago, the loss of the Space Shuttle Challenger shocked the Nation and dealt the US space program an unprecedented setback. The grounding of the Shuttle fleet severely impeded access to space for our country's military, scientific, and commercial payloads. Further compounding the problem were the two Titan 34D failures resulting in the standdown of this launch system since April 1986.

This series of accidents created a national crisis, one requiring development of a national space launch strategy that does not rely on any single launch system as our primary means to space. Since the tragedy, the Department of Defense, the National Aeronautics and Space Administration, other government agencies as well as the civil and commercial communities have worked intensively together to develop a plan of action that will not only recover our launch capability but place it in a far stronger position to assure our continued access to space in the future.

Our recovery strategy centers on the development of a mixed fleet of launch vehicles, and is based on several key guidelines. First, DoD will maintain its commitment to the Space Shuttle program. When the Space Transportation System (STS) again becomes operational, it will remain a key element of our launch fleet. Secondly, some missions will be selectively off-loaded from the Shuttle and moved to expendable launch vehicles (ELVs). To further promote an assured access to space capability, dual-coast launch facilities will be developed and maintained. Finally, selected military users of space will pursue satellite dual-compatibility, whereby specific satellites will be designed to fly on either the Shuttle or an ELV, as the situation warrants.

Clearly, this recovery approach demands the acquisition of additional launch vehicles, as well as development and maintenance of a national launch vehicle production and launch services industry base. However, due to the long lead-time required to produce new assets, no additional launch capacity can be provided in the near term. Therefore, the United States must continue to prioritize our existing assets -- primarily the Titan 34D, Delta, Atlas, and Scout -- efficiently employing them to satisfy national security needs. We will complement these existing assets with a fleet of Titan IV boosters now on contract for initial launch in late 1988. The Titan IV will launch Shuttle size payloads. Air Force plans also call for the modification of at least 13 existing Titan II intercontinental ballistic missiles for launch of such payloads as the Defense Meteorological Satellite Program satellites. These ELVs represent the majority of the Nation's current and planned inventory. For the most part, they are already dedicated to specific payloads and cannot be readily rescheduled. Near term Shuttle payload scheduling, on the other hand, has remained a dynamic process since the accident, with national security having the greatest influence on Shuttle payload decisions.

The recovery strategy will stress the acquisition of additional assets to close the gap between launch requirements and capabilities. Congress provided us with supplemental funding in the FY 1986 and FY 1987 budgets for 13 additional Titan IVs -- for a total of 23 vehicles -- and the medium launch vehicle. The medium launch vehicle contract for the Delta II booster was awarded in January 1987. With an initial buy of up to 20 vehicles, the Delta II is scheduled to start launching Navstar Global Positioning System satellites in late 1988. By selecting the Delta II, the Air Force is also encouraging the commercial space launch industry. A healthy commercial space industry makes space more accessible and affordable to all the Nation's needs -- military, civil or commercial.

While acquisition of additional launch vehicles greatly aids space launch recovery in the near-to-mid-term, we must also look to the future. Our far term objective is to significantly lower the cost of space launch. Further, the NASA Space Station and possible SDI deployment scenarios could drive launch requirements considerably higher by the mid to late 1990s. This drives a need for even more capable launch systems.

Alternatives for the far term are currently being analyzed in the joint NASA/DoD Space Transportation Architecture Study (STAS). The STAS contractors have been analyzing all aspects of space launch, including requirements, vehicles, operations (such as ground operations and payload processing), logistics and manufacturing processes. Technological advances will clearly be needed in areas such as propulsion, lightweight structures, automated operations, and advanced avionics. Incorporating these advances into innovative system concepts should enable the US to achieve a significantly more costeffective space launch program for the post-1995 timeframe, and possibly sooner.

For our far term strategy, the STAS points to a 1990s need for an unmanned cargo vehicle, and a post-2000 need for a new manned system to replace the Space Shuttle as it nears the end of its operational life. As the Congress is aware, the Strategic Defense Initiative Office has requested supplemental funding to accelerate the Heavy Lift Launch Vehicle. We must begin to investigate alternatives for these new more capable and cost-effective systems now if our needs are to be met in the future.

The loss of the Challenger and the prolonged grounding of the Titan 34D painfully underscored our Nation's need for a robust, balanced fleet of launch vehicles and facilities to assure our access to space. The national recovery plan I outlined above will provide the additional assets -- and planning for the future -- to ensure the Nation will never again be faced with the situation we have been faced with for the past year. It is the first step toward restoring America's leadership in space.

Mr Chairman, this concludes my remarks.

Chairman CHILES. I thank you both for your most interesting statements.

I want to say, just for the outset, I want to put a statement in the record from Senator Domenici, the ranking minority member of the committee, and former chairman.

He says, "Mr. Chairman, I regret that I am unable to visit your home State to personally attend this hearing on U.S. space policy. While I cannot be with you now to hear the testimony of our distinguished witnesses, I look forward to reviewing the proceedings of this hearing.

"Support for a strong space program, both civilian and military, is absolutely vital to our Nation's interests and I fully appreciate the importance it plays in this region's economic base."

I think it is important I place in the record, he had planned to be with us today, and was unable to be here.

WHEN WILL NASA SCIENTIFIC MISSIONS RESUME

Mr. Myers, with the loss of the Space Shuttle, certainly it was a disaster for the families of those that lost their lives in the tragedy, and a disaster to the Shuttle program. It was also a disaster for the civilian based science.

The loss of the Shuttle has forced us to cancel a number of space science missions, the Galileo mission, the Jupiter lab delayed 3 years, the astro ultraviolet observatory delayed 3 years, and the atmospheric laboratory will be pushed back to 1991, and the Ulysses Solar Observatory will be delayed, and the Hubble Space Telescope which, as you said, is going to usher in a new era, astronomy is not going to be launched now until 1988.

When are we going to get back on track to NASA scientific missions?

I am worried that this increased loss we are now seeing coming up forward in the Space Station, the problems that we have had with the Shuttle are going to further delay those, and we have seen that happen time and time again because we have placed importance on the Shuttle and we delayed those others. And they are tremendously important to us as a country.

What are you doing to go forward with those?

EXPENDABLE VEHICLES NEEDED TO HELP RECOVERY

Mr. MYERS. Mr. Chairman, we are recognizing that tremendous loss in science capability and have initiated what we call a mixed-fleet study. NASA has embraced the President's view that we should have a mixture of the Shuttle and expendable launch vehicles. And we have been reviewing the potential improvement in the schedules that could be accommodated by bringing expendable launch vehicles into the inventory.

Now, the problem is, because we had so little production capacity in this country on expendable launch vehicles, it is going to take time to get those vehicles cranked back up again to get production going and to get to the place where there is robust capabilities in this country for expendable launch vehicles.

And we are pursuing that just as hard as we can. We have not concluded those studies. We know we have a very strong need for an expendable launch vehicle in 1989 and another one in 1990. We are working hand in hand with the Air Force looking at opportunities and possibilities to make that come about.

We know that in the future we are going to need additional expendable launch vehicles. When we look out in the time period of 1993 and 1994, we are still going to have a big backlog of scientific payloads, and we are still going to need some expendable launch vehicles in addition to the four Shuttle orbiters.

MUST SPEED TRANSFER OF SPINOFF TECHNOLOGY

Chairman CHILES. You mentioned that NASA probably does a better job than any of our other governmental agencies or departments in transferring technology. I agree. I think that's correct. And you said that we have the serious and determined program that we are working on. I agree with that.

One other thing, I think, though, that we have to add. We have got to do it more quickly. I don't think we still look around and we see the times in which our trading partners and our competitors take our literature once we publish, and take scientific breakthroughs that we make, and then get to the commercial market faster than we do.

I think we have got to cut that time. And also, because of the dollars that we are talking about, we are going to have to prove to the American people that there is a faster transfer and a faster spin-off of this technology we are developing.

Now, you said that we are spending a modest sum of money for that, and I think that's correct, how we design that so that we do that quicker. I think the Congress responds very quickly. I would like to have you try to tell me any ways, or give me any information as to how we can speed up that process. That I think is essential, as we go forward, that we are getting those products out there quicker.

The Air Force is going to have to do the same thing in its programs. We have got to do this as a Government much, much faster than we are doing.

HEAVY LIFT CAPABILITY IMPORTANT TO NASA

Mr. Myers, has NASA given any thought to using this heavy lift capability that we are talking about in the mid-term, and the Air Force is talking about designs to bring up the larger elements of the Space Station into orbit where it can be assembled by crews operating out of the Shuttle?

Mr. MYERS. Yes; we have some preliminary looks at that, Mr. Chairman. I am personally very attracted by the idea. I can't say that we finished the studies, because it is a complex operation that is involved. The way the Space Station is now assembled is to use several flights of the Shuttle. By the sixth flight of the Shuttle, we have a man-tended capability, by the eighth flight of the Shuttle we have permanently manned capability, the way we are presently planned.

Looking at that same series of launches, using the heavy lift launch vehicles, it appears we can do the assembly of the Space Station in either two or three launches. In other words, by carrying much larger pieces up, and then assembling them, we may be able to put the whole Space Station together in about three launches.

Chairman CHILES. In three launches?

Mr. MYERS. Maybe. It may. I am saying that as a preliminary result of our studies.

Chairman CHILES. That certainly would help you reduce the cost.

Mr. MYERS. First, it would help reduce the cost because the launch vehicle itself will cost less per pound to put these in orbit.

Second, it will free up a few Shuttle flights that can be then used for science missions. And so there are a couple of advantages that come out of the use of a heavy lift launch vehicle.

Third, it gives us two strings on our bow. The same thing that the Air Force is looking for, the opportunity to trade off one or the other. And so, we are very interested in that opportunity.

There are also some other opportunities. Let me give you an example. The Galileo mission, which goes to Jupiter, was originally planned to be launched with the Shuttle Centaur. Because the Centaur was cancelled due to safety issues with the Shuttle, we now have to launch Galileo using some complicated orbital mechanics where we go out past, I believe it is Mars, back around the Earth again, and then slingshot out to Jupiter.

It is going to take 5 years of transit time. If we had a heavy lift launch vehicle, we could go direct in about 3 years. So there are really major advances that come out of getting a more robust capability for launching our planetary missions. It doesn't necessarily mean larger payloads. It means quicker response time. A quicker response for the satellites and their activities.

So we are very excited about the potential of the heavy lift launch vehicle. We are working closely with the Air Force on how we would best utilize a tremendous launch vehicle development capacity of our national space flight. And we have now received a letter from the Secretary of Air Force concerning this and we are in the process of getting a response back to him on how we see the interacting management of this program to best serve the Nation as a national space transportation capability.

COMMERCIAL LAUNCHES AT CAPE

Chairman CHILES. General, I understand, and you told us in your testimony, that the Air Force is moving to make the current Titan 34D pad at the Cape available for commercial launches.

Give us a little bit more on the status of the commercial interest in that Titan system, and what you hope to do to make the Titan, and the new Delta II medium launch vehicle attractive to commercial customers. And if you could, tell me what the impact of that would be.

General RANKINE. I will be glad to do that, Mr. Chairman.

Concerning the impact to the Space Coast here in Florida, I think that that can be understood best by looking at it the same way that the Air Force and Department of Defense looks at it. We want to ensure access to space, and so we're looking for these two paths to space, the Shuttle and the expendable launch vehicles.

The local community here has been impacted in the past. When a mishap occurs on the Shuttle, there is quite a large swing in employment, and everything comes to a standstill. So, I think you can see that by having a diversity of vehicles by which we can put payload into orbit, we also have spread employment across the broader systems. So, I would expect there would be a considerably better stabilization of the economy here in the Space Coast and the local area.

You are going to have, I think, witnesses later on today from Martin Marietta and McDonnell Douglas who can give you some particulars on what investments they would need to make here in the local area.

But one thing the Department of Defense is doing, as I pointed out previously, we are developing what we call a model agreement to be used between the Air Force and prospective commercial space launch companies such as Martin Marietta or McDonnell Douglas, and General Dynamics. And this model agreement which would allow us to permit use of our Air Force ranges and our Air Force launch facilities by these commercial enterprises. We could do that, as I said earlier, on a direct cost basis. And that means that the overhead cost, which the Air Force would otherwise bear whether the commercial enterprise is there or not, would be borne solely by the Air Force. And only the incremental cost, the additional cost would be borne by industry.

In addition to that, as I pointed out, we will waive R&D recoupment costs. We have invested in some funds in the Delta to enlarge this capacity. Federal acquisition regulations maybe would permit us to recover some of those development costs from subsequent commercial sales of that launch vehicle. The Secretary of Defense has waived that requirement.

And so, that also will reduce the cost at which commercial industry can offer the Delta, in this case, the winner of the medium launch vehicle competition.

We believe that all of these aspects will help to make a U.S. space launch industry competitive internationally.

Chairman CHILES. Thank you very much.

Our next panel will be Mr. Norm Augustine and Mr. Joe Boyd. And while they are coming up, I will say that we are fortunate to have with us today two presidents of industry, Norm Augustine from Martin Marietta, and Joe Boyd from Harris Corporation. And they are going to talk with us about the subject of competitiveness and national science needs.

If we are going to regain our position of top of the world's high technology, we have to be willing to make a new vision and make new developments. And these two distinguished leaders will discuss that vision with us.

Norm, we will call on you to start with, and let you make your oral statement. Let me say, your statement will be inserted in the record.[1] We appreciate your oral statement.

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[1] See p. 561.

STATEMENT OF NORMAN R. AUGUSTINE, CHAIRMAN, DEFENSE SCIENCE BOARD TASK FORCE ON DEFENSE SEMICONDUCTOR DEPENDENCY

Mr. AUGUSTINE. Fine. Thank you, Mr. Chairman. I would like to submit then the formal statement and speak extemporaneously for a few moments here.

Certainly science and technology represents one of the fundamental counter-opinions of our Nation that deal with some of the problems which face us. Those problems have a technological content. Their solutions range all the way from providing national defense, from building a new space program, to providing energy, or solving environmental problems we face, and certainly not least importantly, to building a strong national economy as we move toward the next century.

TURNING POINT IN COMMERCIAL TECHNOLOGY

I believe that it would not be an overstatement to say that today may be the turning point in science and technology in America. It may well be, as we look back from the vantage point to the next century, say the year 2020, with 20/20 vision, if you will, that we may find that it was in the late 1980s that we took the actions that either led to the gradual demise of commercial technology as being the world leader, or that we took those steps to assure its continued preeminence in the world. Both from a pure scientific standpoint, and also from a commercialization or industrial standpoint.

We must be particularly certain, as we address the space program in the future, that we do not permit the *Challenger* accident to become two tragedies rather than the one we have already suffered.

A second tragedy that could face us if we don't take the proper steps would be one wherein we would lose our national sense of adventure, our willingness to take challenges, and indeed the willingness to take prudent risks. We cannot let it be said that the penalties for failure become greater than the rewards for success, and that we refused to strive for great goals, to take on new opportunities.

THE SEMICONDUCTOR INDUSTRY

This is also a turning point for one of our critical technical industries in this country. During your opening remarks, Mr. Chairman, you mentioned the semiconductor industry, and that indeed is an industry facing a great challenge today. And I would like to confine my remaining remarks to that industry.

As it happens, Martin Marietta is not considered to be a participant in the semiconductor industry. We make a few special purpose devices for our own use, but we are not a member of that industry.

My interest stems from a study that the Defense Department initiated about a year ago arising from a concern the Secretary of Defense had over the health of the semiconductor industry and its ability to support the defense program, including the defense space program.

It has been my privilege to serve as chairman of the task force that's been investigating the semiconductor industry on behalf of the Defense Department. That group worked for about a year, and in the last few months completed its study, and only recently released its final report.

I will just say briefly that the membership of the group included a number of people qualified, I believe, to deal with the topic at hand. It included 11 members of the National Cabinet of Engineering, 7 former presidents and appointees, and the individual who invented the integrated circuit, and the individual who is credited with first commercializing the integrated circuit in this country.

The semiconductor industry is truly a "Made In America" industry. In a sense, it comes out of the transistor, which was an American invention. The integrated circuit was an American invention. And for many years, the American firms were predominant in that industry.

Today, that industry faces a battle for its very survival in all except perhaps the overseas markets.

This affects the Nation in many very fundamental ways. It affects the space program in that we are pursuing—and I am speaking as an individual for the moment. I would hope to see, in my lifetime, my own hope would be to see a new orbiter and that a Shuttle program would be established; secondly, a Space Station; and thirdly, a man landing on Mars. I believe all those things could well happen within my lifetime.

DEFENSE DEPENDS ON SEMICONDUCTORS

All of those depend very heavily on the use of semiconductors. Simply the provision of national defense, as the committee well knows, our strategy in this century has been to offset in America inferiority of military equipment as compared with, say, of the Soviet Union's by having technologically more advanced and superior smaller armed forces, fewer people in the armed forces, and hopefully fewer casualties in the case of combat.

That technology which underpins that very strategy is smaller but more capable forces, and in turn very, very heavily depends upon the use of semiconductor integrated circuits. Almost any advanced military system runs with this makeup, all the way from spacecraft to Army tanks are completed with large numbers of the semiconductor devices.

Thus, the semiconductor industry is in dire straits, which I hear it is in many respects. It has a major impact on our ability to provide for national defense.

ECONOMY DEPENDS ON SEMICONDUCTOR INDUSTRY

Then finally, this Nation's economy as a whole depends on a considerable degree, and a growing degree on the semiconductor industry. This isn't often recognized, but, of course, one can't deliver computers without semiconductors. One can't deliver telecommunication systems, one can't deliver many of the commercial electronic products we have without modern integrated circuits.

Although the semiconductor industry itself is medium sized, one might say, perhaps a $25 million industry worldwide, it supports what today is a $400 billion information industry growing to about $1 trillion in the year 2000. So, the semiconductor is really, in a sense, the tip of the iceberg that supports the whole iceberg. And its impact on national economy, national defense in the space program can hardly be overstated.

CONDITION OF SEMICONDUCTOR INDUSTRY

What is the health of the semiconductor industry in the United States today is, frankly, not very good. If one considers the Dynamic Random Access Memory, or DRAM—or DRAM as its called—that's a device that could be called bellwether chip of the industry in many regards. About in 1970, the United States had nearly a 100 percent share of the world's supply of those devices. Today the U.S. share is well under 10 percent.

In 1970, there were 14 firms building the most advanced version of that circuit, today there are three U.S. firms. Today there are eight Japanese firms building those circuits. And it is a growing number. And even the normal three firms building the most advanced circuit DRAM, only one of those are in the merchant market, or sells to other firms to use their product.

REASONS FOR COLLAPSE OF INDUSTRY

How did we get into this situation? I think it has taken us many years, and there is no one explanation, and that's what makes the solution so difficult. Initially I suspect the problem arose out of the lower labor cost elsewhere in the world, particularly in the Pacific Rim, U.S. firms moved to production offshore to take advantage of that lower labor cost. The ratio in the relationship between the yen and dollar has certainly been a factor until recently. There have been many other factors that one could cite.

Perhaps the most important one, though, was the fact that the Japanese nation, as a whole, their government, their industry, and their academic institutions work together in a concerted fashion on very long term goals. In the United States, a joint effort like this has been very seldom seen. I might say that the space program is a good example of where it has been seen, I think.

The impact that this Japanese approach has been one that I guess I would describe less with anger, more with admiration, because it is an enormously effective way to compete in the world markets. Thus we have large Japanese organization, governmental industry, and academia combined, competing with individual small United States semiconductor manufacturers, and the outcome is neither surprising nor, in my judgment, unpredictable. And we are well on our way to seeing the outcome of that if we don't do something differently.

STEPS TO RECOVERY OF INDUSTRY

What might we do differently? I am sure there are many alternatives, and the Defense Department and the commercial industry is considering the number of alternatives. And, of course, the Defense Department has addressed itself to many industries in addition to the semiconductor industry. However, the findings of the Defense Science Board Task Force could be described in two recommendations. There were many others, but there are two that I think are most important.

The first is establishment by U.S. industry, calculated by U.S. industry of the Semiconductor Manufacturing Institute that would permit all the firms which are in the semiconductor industry to jointly work together to share and not to duplicate one another's research in manufacturing techniques. And manufacturing has been an area where the United States has clearly neglected its focus.

The recommendation includes ones that the institute has established, that the Defense Department would provide contract support to the institute for the purpose of obtaining that technology which is used by the Defense Department in order to assure national defense.

The second recommendation is that the Defense Department set up centers of excellence, in particular technologies that need different universities in the United States, in the area of semiconductor research.

I believe that if those steps are taken or some steps similar to those, that it would be possible for the U.S. semiconductor industry to recover from its current situation and again regain world leadership, whereas it would have a minimum world competitiveness.

AMERICAN JOBS THE OUTCOME

I believe that absent those steps we will find that the Japanese strategy has worked once again. Not only will we lose the semiconductor industry, but even more importantly, we will lose those industries that are critically dependent on the semiconductor industry. And the target, I believe, the Japanese have set for themselves is the entire information industry. Computers, telecommunications, commercial products and the likes.

And that industry which otherwise would be the largest U.S. industry in the year 2000 may turn out to be a Japanese industry, and that the main export from the United States may turn out to be our jobs.

So that, Mr. Chairman, I think, is the challenge we face. There have been very few task forces that I have been involved in in my career that I believe are more serious than this one.

I particularly thank you and the members of the committee for the opportunity to share with you my thoughts on both the problem we face and the opportunity we have to resolve it.

Chairman CHILES. Thank you.

[The prepared statement of Mr. Augustine follows:]

STATEMENT OF
NORMAN R. AUGUSTINE
CHAIRMAN, DEFENSE SCIENCE BOARD TASK FORCE ON DEFENSE SEMICONDUCTOR DEPENDENCY

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COMMITTEE ON THE BUDGET
UNITED STATES SENATE

* * *

MELBOURNE, FLORIDA
MARCH 9, 1987

Mr. Chairman. I welcome the opportunity to participate in this very important committee hearing on science and technology in the context of the national space program.

In my opening statement, I would like to offer some general observations on the overall subject of science and technology, and then turn to the specifics of a recent study of the semiconductor industry by a Defense Science Board Task Force, of which I had the honor to be chairman.

Science and technology are the lifeblood of this country today, in terms of national defense, the economy, our present and future posture in the world, and our ability to meet the natural and manmade challenges of the late 20th and the 21st century. Knowledge, and the application of knowledge, are our greatest strength, our primary product, our leading growth industry, and our safeguard in facing the unknowns of the future.

Arguably, the U.S. space program has been the most successful research and development enterprise in this or any other nation's history. It has been a technology generator, a knowledge generator, with few parallels. The American people have supported it with deepfelt pride and enthusiasm not only for the great personal courage and capability so much in evidence through the years but also for the leadership in science and technology the program has encompassed.

Even in the days immediately after the Challenger accident, I was encouraged to see that the results of a nationwide poll by Market Opinion Research registered overwhelming support for an energetic space program. For example,

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89% of those polled favored resumption of Shuttle flights, 73% described NASA as on the cutting edge of technologies, and 71% said they want to see the United States ahead of the Soviet Union in space exploration.

At the heart of this widespread support, I believe, is the recognition that, as President Kennedy said in announcing the Apollo program, "space achievement ... in many ways may hold the key to our future here on earth." A quarter-century later, Mr. Chairman, I would respectfully submit that those words in their diverse dimensions could well provide a theme for our deliberations here this morning.

The space program is the embodiment of high technology and has been one of its principal drivers not only in this country but elsewhere in the world. By its nature, it brings together government, industry, and academia. The payoffs in basic and applied sciences and technologies, with applications literally throughout the economy, have been immense in the past and should be immense in the future. Establishment of the Space Station, in effect providing a permanent research and development center in orbit, will of course be another giant step on this road of scientific and technological progress.

Before turning to the particulars of semiconductor technology, Mr. Chairman, I would like to make one further point. Technological leadership is a valuable national resource and it is also a perishable resource. We have to keep working at it. Our country has done extraordinary things in space that have

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meant a great deal in practical and less tangible terms. Here as elsewhere, however, I believe we must exert continuing and determined effort to maintain our technological preeminence and its widespread rewards.

The semiconductor--also variously known in its most common form as an integrated circuit, a microchip, or simply a chip--presents an example of a made-in-America technology and industry now very seriously threatened by overseas competition, primarily from Japanese firms and others on the Pacific Rim. Semiconductors are of course basic and essential components, building blocks if you will, of space systems, modern defense systems, and much else in the fields of consumer electronics, information systems, and high-speed telecommunications.

Because of the essential nature of microchips in development of advanced defense systems, the Department of Defense initiated a study by the Defense Science Board about a year ago to examine the impact of trends in the semiconductor industry on national defense. I might note in passing that the Department also is currently examining industrial readiness as it is affected by other industries facing serious problems of competitiveness.

The DSB Task Force, under my chairmanship, now has completed this study and recently issued a report on "Defense Semiconductor Dependency." The members of this Task Force and its advisory group were highly qualified representatives of government, industry, and the technical community, including the inventor of the integrated circuit, eleven members of

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the National Academy of Engineering, and seven former Presidential appointees. I should emphasize that my comments on this subject are the product of the Defense Science Board, which is strictly an advisory group. Our recommendations are being considered by the Department and will become policy only if accepted after appropriate consideration.

I also should point out that my company, the Martin Marietta Corporation, is not itself a part of the semiconductor industry in the sense of this discussion. We design a certain number of chips, manufacture a smaller number for specialized uses in defense systems, and participate in research to meet such special needs. But, by and large, we are customers for chips on behalf of our space and defense customers -- the various services and agencies of the government.

Obviously, any inquiry about the semiconductor industry has to begin with an effort to ascertain its true state of health. How serious is the problem? The answer, the Task Force found, is that the industry is unquestionably in a state of considerable duress. A few comparative figures make this clear:

o One critical indicator is the so-called "bellwether chip," the dynamic random access memory or DRAM chip. The market share of U.S. manufacturers in this area has gone from 100% in 1970 to well under 10% today and continues to decline.

o The U.S. share of the worldwide merchant semiconductor market, or open market, also has been declining steadily--from nearly 60% in 1975, to below

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50% in 1985, to below 45% in 1986. Japan's share over the same period has increased from 20% in 1975, to 40% in 1985, to slightly more than the U.S. 45% share in 1986. The merchant market in general, and the DRAM market in particular, are of primary relevance to defense needs, because the former generally comprises the defense suppliers and the latter is the highest volume segment of this manufacturing-intensive industry.

o The most advanced generation of memory chip is today being produced by eight Japanese firms but only one U.S. merchant firm and two U.S. "captive" firms.

The trend, without a concerted rescue effort, is clear and it has several other aspects. Possibly most critical of all is the fact that R&D in the U.S. semiconductor industry also is lagging. Further, the U.S. once dominated the vital semiconductor manufacturing equipment industry, with a market share of more than 90% in the early 1970s. The U.S. share now is less than 50% by most measures and declining rapidly as another significant capability moves offshore.

Perhaps the best known U.S. supercomputer, the Cray, has 100% of its memory chips and 10% of its logic chips made in Japan. As the Japanese move into the supercomputer field themselves, there is every reason from a business standpoint to expect that they will begin to deny the latest chips to competitors in this country as a normal business practice.

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From the Task Force's point of view, two particular factors put these circumstances in perspective:

First, sophisticated semiconductors, the products of a swiftly declining U.S. industry, are essential in the whole range of defense systems from early-warning satellites to battle tanks, from frigates to fighter bombers, from smart projectiles to strategic weapons. We cannot build modern systems without semiconductors, and without incorporating continuing technological advances in each new generation of equipment.

Second, the defense and civilian space market is now less than 10% of the overall market for semiconductors, although as recently as the 1960s a large percentage of semiconductors produced went into these systems. Today electronic chips provide a major example of the migration of new technology from defense and space to the commercial economy. The bottom line, therefore, is that only a commercially successful industry can be a dependable, modern, long-term supplier for defense systems.

At present, we found, most microchips incorporated in U.S. weapon systems are, in fact, produced by U.S. companies. If the present decline in market share and resultant industrial vitality continues, however, there is no question that defense manufacturers will have to turn to overseas suppliers and accept overseas dependence for these essential components. In our DOD study, we concluded that this option was unacceptable in terms of our long-range national security. I assume that most Americans would agree.

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The economic corollary of U.S. retreat from this technology-intensive area seems equally untenable at this stage of world history. We are living at a time that has been described as another industrial revolution based on various applications of electronics through computers, communications, artificial intelligence, and so on. The semiconductor underpins the entire, broad information systems industry, which is a $400-billion industry worldwide today, is expected to be a trillion-dollar industry by the year 2000, and potentially will be the most important segment of the U.S. economy in the 21st century.

While the Task Force's mandate, and primary concern, were the defense implications of this subject, the group also reached the parallel conclusion that the purely economic aspects were of immense import in themselves.

In response to this broad challenge, we reached several recommendations intended to restore and enhance our competitive role in the semiconductor marketplace. The most fundamental recommendation is to establish a Semiconductor Manufacturing Technology Institute as a U.S. industry consortium, with capitalization by its member companies and support by DOD through contracts over the next five years for development of critical production processes, equipment, materials, and devices. In essence, this would be a generic manufacturing technology organization with emphasis on transferring the results to the production lines of the member organizations.

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It must be emphasized that the Task Force recommended government support of this initiative solely from the standpoint of national defense requirements. That is to say, the hypothetical question, "Why should the government spend money to bail out the semiconductor industry?" seems as irrelevant in this case as asking, at the outset of World War II, why the government should procure ships and planes since doing so would surely benefit the shipbuilding and aircraft firms.

This and our other recommendations--including establishment of semiconductor science and engineering centers at eight universities--seemed to the group to provide a simple, straightforward, common sense approach to a major and growing problem. I believe that, if undertaken now, before the situation deteriorates any further, they offer a reasonably good chance to restore both our semiconductor industry and our technological leadership in a field with profound ramifications for defense, space, and indeed across the range of our economy.

Undoubtedly there are other potentially effective approaches to the problems of the semiconductor industry. This was the approach, however, that the Defense Science Board Task Force recommended to the Department of Defense. I should stress that I am not prepared to say similar approaches may be necessary, appropriate, or effective in other technological areas. I simply don't know. We have been looking only at one very specific, if broadly

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significant, technological area with its own set of circumstances and we have suggested solutions that may not be readily transferable or applicable to other problems.

With that, I will conclude my prepared statement. The topics being addressed in this hearing, Mr. Chairman, are among the most important before our nation today. I appreciate the opportunity to participate and look forward to continuing this discussion in response to any questions you may have.

Chairman CHILES. Dr. Boyd?

STATEMENT OF DR. JOSEPH A. BOYD, CHAIRMAN, HARRIS CORPORATION

Dr. BOYD. Thank you, Mr. Chairman. I am pleased to be here this morning with this discussion.

UNITED STATES FIGHTING TWO WARS

I would like to frame my comments in the overall context of U.S. competitiveness in the world. And I will emphasize science technology and education in this respect.

Today, the United States is fighting two wars. We are fighting a cold war and we are fighting an economic war led by Japan and the Asian rim countries, as referred to by Mr. Augustine.

So far, we are winning the cold war and we are losing the economic war. And if we lose the economic war, we cannot possibly continue to win the cold war. So, the cold war becomes the one of critical priority.

THE ROLE OF TECHNOLOGY AND DOD STRATEGY

I would like to comment on these separately, if I may.

First, I would like to review and again emphasize something Mr. Augustine said, the role of technology and DOD strategy.

Since World War II one of the basic complaints in our defense strategy has been to use technology as a leverage to, he said, minimize the individuals required in our defense force, and to take advantage of the space technology. This has had a profound impact on not only the Defense Department, but U.S. industry in the world.

Through primarily DOD and NASA, the U.S. Government has served as an agent for making perhaps the greatest changes in civilization in the last 45 years. Now I would suggest to the chairman and the Congress that this strategy is not fully understood, or perhaps fully accepted in our society. And it has led to some very critical—perhaps critical—certainly some situations in our society has weakened our overall efforts.

First, I think it has contributed to what I would consider the distrust between DOD and the public, it has contributed to a computational relationship between DOD and industry, and it has affected perhaps the most fundamental relationship between DOD and our universities. I would like to comment on those briefly.

GOVERNMENT/UNIVERSITIES RELATIONSHIP MUST BE STRENGTHENED

In the universities, for example, the necessity for security and control of the information in the Nation since the 1960s has weakened the basic relationship. Not only the research relationship that we depend on, but the educational role of the university. We have no other real institution in this country for providing us with research and education except our universities. We have the greatest educational system in the world. And during World War II the partnership was formed between the Government and the universities. That is not as strong as it should be today and we need the best of that relationship.

In the case of industry, I think that the very of DOD strategy, we depend on advanced technology, not standard state-of-the-art advanced technology in many of our weapon systems. This, by definition, requires specifications of schedules and risks that are not inherent in the commercial world.

I think that, in general, the Defense Department and the defense industry have been well-managed and served our society well. But I think it is dangerous for us to continue with some of the relationships that you see and you read in the papers today. There are weaknesses in every system. I believe that the Congress should take a leadership helping to reestablish that trust and that relationship.

For example, one of the most efficient and effective ways of conducting advanced research and development in our industry today is the internal research and development programs.

There have been plans and attempts to cap and to eliminate that even. This is a relationship where industry shares in the cost of doing advanced development because of interest in development. I think this is an example of something that needs to be re-examined in our present environment.

DOD and NASA together contribute not only to the defense program of the United States, but the defense industry. And in spite of the arguments to the contrary, over the last 50 years, DOD programs have had a profound impact on technology and U.S. industry in the world, and will continue to have that. And certainly, while it is not the primary purpose of the DOD technology program, it certainly is a very, very strong result of that. Particularly in the early cases when we are doing exploratory and feasibility studies. DOD's contributions are greatest in the exploitation of technology into commercial. Well, obviously DOD doesn't play an important role. But in the early phases, DOD has played an important role in the years, and NASA is now supplementing that.

I would urge you to use your leadership to re-emphasize this fundamental strategy and be sure that it is fully understood in the investigations of Congress and other agencies of the Government, when we are trying to manage and to investigate both the NASA programs and DOD programs.

For example, I think that SDI, occasional military, and the manned space programs for NASA, are fundamental in the future of not only the United States but the world of science, and all the related technology problems that are associated with those.

THE ECONOMIC WAR

And now I would like to comment briefly on the economic war.

From 1945 until 1975, the United States dominated the world in technology and economics. In those days, we had no competition. When you have a monopoly on something we don't worry too much about being efficient or cost effective. And as Mr. Augustine and others have said, perhaps we weren't aware of what could happen.

But what did happen is that Japan copied our market-oriented, free-enterprise and privately owned system. They did a great job. They did a better job than we did. They formed it for a world strategy and competition in the export market.

By about 1975 we had lost our monopoly. The Japanese have effectively transferred our technology to society at the cost of about half of ours. That is a great shot to our system.

In the event the record is not clear, we know what happened. He has given you a very dramatic example of only one industry. There are other industries I think that serve that purpose also.

The current status of U.S. trade is, I think, a critical issue for our country. In 1984, the United States was the world's largest creditor Nation. Today we are the world's largest debtor Nation. Today we owe the rest of the world and our international investment account about $300 billion. Last year that increased by $170 billion. And my best estimate this year will be $140 or $150 billion. Many people are suggesting we will have a trillion dollar debt by about 1990 or 1991. Whether it is a trillion dollars or $800 billion, it is a big number. People say, well, don't worry about it, it will take care of itself.

It will take care of itself. The only question is, what will be the standard of living in the United States when we're balancing our current account?

There is no question that we are going to have to do something different from what we are doing now. There are many causes for this. We do have people that limit our imports to their countries, like Japan and others. We know that there is the oil OPEC country economic trouble.

But the most fundamental of all that we must consider here is that the United States is not being competitive with the rest of the world, particularly the Asian rim countries. I am talking about on a cost effective basis.

So, we need to do something. We must develop a winning competitive strategy in the area of world trade. I would recommend to you, sir, that you consider at least two fundamental issues.

One is, we must have a short-term program which would ensure the survival of critical U.S. industries, such as has just been described here. We must also consider lessening that international debt. The implications of a trillion dollar debt have not been fully realized in our society. It will result in a lowering standard of living. It will result in perhaps having to finally close our borders to imports, and have very serious consequences.

Then we have longer term problems, of course, of re-establishing our over-all competitors in world trade. And that means we have to look to the area of productivity where technology is perhaps one of the most important factors. And we have to look to capital-related cost. And there are many facets of that, of course the interest and availability of a capital being one of the primary ones.

Now, in conclusion, I would say that the cold war is going to continue. It is going to be necessary to continue our support of that. But, now, perhaps the greatest challenge we have had since the beginning of World War II is the economic war.

Mr. Chairman, your leadership in addressing the national budget, the defense budget, and the space program is well-known. I would urge you to give your leadership and your support to programs that would address the trade war, which is particularly aggressive.

Thank you, sir.

[The prepared statement of Dr. Boyd follows:]

BEFORE THE
SENATE BUDGET COMMITTEE
UNITED STATES SENATE

TESTIMONY OF

DR. JOSEPH A. BOYD
on behalf of the
HARRIS CORPORATION

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9 MARCH 1987
Melbourne, Florida

Mr. Chairman, I am Joseph A. Boyd, Chairman of Harris Corporation, and I am pleased to be here today to provide views on critical issues of our time. This morning I would like to briefly identify concerns we have relating to the current United States position in

-- Competitiveness in the World Market
-- Science and Technology
-- and, Education

and to identify some actions which the Congress can take to help resolve these concerns.

Only a few short years ago the United States enjoyed a position of leadership in nearly every area critical to the economic and physical welfare of our people. Our manufactured goods in all areas (steel, electronics, automobiles, apparel, semiconductor products, space, etc.) were the envy of the world -- and our exports far exceeded our imports. Finally, our colleges and universities were graduating scientists and engineers at a rate that exceeded all other countries. These bright, new resources were developing scientific and technological advances at an unprecedented rate. We were the scientific and technological leaders of the world. This leadership was probably exemplified by our space program -- which had accomplished the phenomenal feat of sending men to the moon and safely returning them to earth. The technological spin-offs from this great accomplishment were fueling our broader economy -- providing new products and benefits which further established our position of world industrial leadership. Examples of some of the new commercial products resulting from this technology include:

- -- Semiconductor products such as digital watches, digital calculators, personal computers.
- -- Materials advanced especially in lightweight, high strength and high stiffness composites which have found broad application in the commercial aircraft industry.
- -- Physiological monitoring technology which has led to a new generation of medical monitoring equipment.
- -- Communications technology which has found broad commercial use in today's information hungry society.

Slowly, perhaps without realizing it, we allowed these positions to erode. Our position in the world marketplace has been overtaken and passed in nearly all areas. Most of the world's steel is produced beyond our shores with a trade deficit of $9B in 1986. The Japanese now enjoy greater than 50% of the automotive market representing a trade deficit of $50B per year in 1986. Japanese semiconductors dominate the world market in several product areas and the world's three largest semiconductor companies are Japanese. According to the Department of Commerce, the U.S. semiconductor industry represents 188,000 jobs and contributes $17 billion to GNP. The significance of the industry, however, extends far beyond these numbers. Microelectronic devices are the key components in computers, telecommunications equipment, instruments, and many other electronic products -- together representing $230 billion in sales and 2.5 million jobs. An agenda to regain U. S. leadership in semiconductors is necessary.

Another alarming fact is that since 1985 the United States has been a debtor, rather than a creditor, nation with a total debt of $107B in 1985 with a projected debt of $800B by 1990, unless action is taken. One significant action that will help reverse this trend is an increase in U. S. productivity. Technology definitely affects our nation's productivity -- and we have lost our technological lead. Other factors affecting the nation's productivity include: management, the American work ethic, and laws and Government regulations. I addressed each of these factors in a presentation at the "Competing in a Global Economy" Seminar held in Melbourne, Florida on December 11, 1986. I am pleased to provide a copy of that presentation for inclusion in the record of these hearings.

In space, the well-planned, methodical program of the USSR now leads the world. The average number of launches per year by the USSR is 100, versus 20 or less by the United States. The Salyut and Mir Space Stations are in orbit, manned, and generating scientific and technological benefits in materials processing, life sciences, space structures, astronomy and remote sensing of the earth's environment and resources. Our Space Station is on paper, in planning, and beset by budget debates. United States commercial space ventures are being forced to turn to the French Ariane and Chinese Long March launch vehicles for access to space -- while we delayed the critical decision to build a fifth Shuttle. Our entrepreneurs have shown a very active interest in the commercial aspects of space with activities under consideration in materials processing, medical sciences and advanced materials. Their motivation, however, is being diminished not only by the uncertainty in their access to space but also by laws and governmental regulations which stifle, rather than encourage, them to capitalize on these ventures which have an estimated value in excess of $100B by the year 2000.

In education, our annual number of science and engineering students has diminished, now hovering near the rate of 100,000 graduates each year. The Soviets are graduating 500,000 each year and the Japanese surpassed our number of graduates in 1986 and project an increasing rate of graduates. In short, our scientific and technological lead in nearly all areas has eroded, while our governmental policy has resulted in an environment which discourages, rather than encourages, research and development advances.

As history has recorded, the pursuit of a new frontier has pushed the limits of technology. Today's frontier - lies in space. At this point in man's history the country that leads in space will largely determine the future -- and at the present time this is the USSR, not the USA. We have the seeds of a vision for the future planted. These seeds include: the Strategic Defense Initiative, which in a few short years has resulted in technological advances few felt possible and promises to help free all mankind from annihilation, and the Space Station, which promises to become our outpost on the Space Frontier -- from which we can reap the scientific, technological and commercial benefits necessary to reestablish our science and technology leadership. Finally, the commercialization of space shows the promise of a new $100B marketplace for the development of new transportation modes, new materials, new pharmaceuticals, and new discoveries. And what of our educational problems? If we cultivate these seeds of vision, we will see a reversal of the current downward trend. The vision of "putting a man on the moon and safely returning him to earth" proved that. Yet more recent proof is what is happening in the Young Astronauts Program. Sponsored by the United States Space Foundation, this program is bringing the vision and excitement of the Space Frontier into classrooms all across the country. And, as described by

Columnist Jack Anderson, the Presidentially appointed Director of the Young Astronauts Program, in every school with a Young Astronauts Program the students' grades are dramatically improving and there is a new thirst for knowledge.

There is no simple solution to the serious problems that confront the nation, however, I do have some specific suggestions. First, the country must be guaranteed access to the Space Frontier. We are well on the way with, a fifth Shuttle underway, the award of the contract for a Medium Launch Vehicle, and planning underway for a Heavy Lift Launch Vehicle. The developmental work now in progress on the National Aerospace Plane (NASP) will extend our capabilities beyond these vehicles. After development is completed, the transfer of this vehicle's technology to the private sector for the so-called "Orient Express" can result in commercial benefits of an enormous value.

Next, the nation and the free world must pursue the Strategic Defense Initiative. The technological fallout from SDI is already tremendous -- bringing us new semiconductor technology, new approaches to power generation, new structural materials, new laser technology which will have broad commercial applications, and new communications technologies. As you are aware, the Stragetic Defense Initiative is only one element of our overall DOD Space Program. While SDI funding has slightly increased, the total DOD budget is flat or declining. These other elements of the DOD are also critical to our nation's security. They provide communications, weather forecasting, etc. This alarming trend of flat or declining budgets must be halted, or we will fall further behind our adversaries.

Third, our civil space program under the guidance of NASA needs a major role in the Space Frontier. The President's National Commission on Space did an excellent job in establishing a roadmap for the civil space program for the next 50 years. The centerpiece of this roadmap is the Manned Space Station. NASA and its contractors have completed the preliminary design of the Manned Space Station. This design will allow us to leapfrog the Soviets' position of leadership in space -- and it will open the frontier for the commercialization of space. As a part and parcel of the Space Station, Congress should enact legislation which encourgages and enhances investment in commercial ventures in space. Examples of such legislation include: R&D investment tax credits for commercial space ventures, NASA lease-backs and/or direct purchase guarantees, assured launch insurance, and termination liability. Additionally, the NASA Space Science and Technology programs must not be sacrificed to finance the space station. A balanced NASA program including space science and technology as well as the space station is needed to regain our leadership in space. This may require a significant increase in the NASA budget.

Finally, I have a strong confidence in our nation's space and electronics industry. We have a highly qualified base of dedicated professionals in industry and the Government who stand prepared to execute a bold vision that will return the U. S. to a position of technological leadership. However, we define the vision and create the environment in which they can work in cooperation to achieve this vision. Governmental laws and policies need changes to encourage, rather than discourage, industry investment in Research and Development and capitalization. For example, in recent years the Independent Research & Development and Bid & Proposal (IR&D/B&P) limits have been continually depressed by the DOD. NASA also utilizes these ceiling limits. These limitations are having an adverse effect on industrial R&D. The laws should be changed to encourage this activity by fully recognizing independent R&D/B&P.

Both Government and Industry must work together to resolve and remove the adversarial relationship that has evolved over the last few years. Government must recognize that industry is truly motivated to provide a quality product, on schedule, and within cost. In the last several years, the Congress has passed many onerous laws to solve perceived abuses in government contracting. Laws that develop special definitions of right and wrong solely for the government are not understood by people working in the process. I encourage you to make a serious evaluation and return to generally accepted legal standards.

Last, but not least, we must act decisively to deal with our international trade problem. The summary of facts relating to the trade situation indicates an urgent need to develop a winning "National Competitiveness Program" of the following general nature:

1) An immediate commitment to a program which will, (a) ensure the survival of critical U. S. industries, and (b) will avoid an economic disaster by limiting the growth of the negative U. S. international investment position.

This may require limiting imports as well as encouraging exports. Techniques may include but not be limited to - bilateral negotiations, quotas, tariffs and taxes. These may be temporary or some may be permanent.

2) A longer term program to reestablish the competitive position of U. S. industry in world trade. To accomplish this, emphasis must be on increasing productivity and decreasing capital related costs. The first step should be a critical sensitivity analysis of the parameters affecting productivity and capital related costs; second, a national effort to effect the indicated improvements.

In summary, I believe our nation is at an extremely significant point in history. We rose from a humble beginning to become the greatest nation on earth -- because we always possessed the courage to expand to the next new Frontier. We are perilously close to losing our industrial leadership. To that threat we must respond!

Thank you. I would be pleased to respond to your questions.

Chairman CHILES. I thank you both for your testimony and the role that each of you have played. I think it has been a very important role in trying to get this information out.

WHAT CAN GOVERNMENT DO

Norm, you mentioned several things that we have to do and that industry needs to set up this consortium. And then you have talked about the centers of excellence.

What do you see the Government's role in the very short term as to what we ought to be doing in trying to focus in trying to help regain competitiveness in the semiconductor area, but also in this broader area? What are the immediate steps that you think ought to be taken?

Mr. AUGUSTINE. I believe the first step would be in the area of underpinning the research, the centers of excellence in a number of universities. That's something that can be done without too much investment in the financial sense. One is talking probably $50 million a year, or $100 million a year, which by the stakes at hand is not a great amount of money, and could have a minor impact. Limited spending at the universities tends to be very highly leveraged.

The second, in terms of time, but perhaps a more important thing, would be once this semiconductor institute is set up by industry, and indeed it is, it does look like that is likely to happen, the Government would award a contract to that agency of perhaps $200 million a year, and that would be in exchange for the technology on the chips that are needed for the Defense Department in particular to carry out its mission of providing for the national defense.

Chairman CHILES. Thank you.

GROWTH BUDGET APPROACH

And Dr. Boyd, you have talked about these near-term goals and then the other things.

What do you see we should focus on immediately?

One of the areas we are going to try to place in the bucket this year on the Senate side is a growth feature. I have decided you can't sell just pain. Talking about it for 3 years and saying the sky was going to fall and the stock market hits a new high, and you just can't get people to sort of understand just what you are saying, that that trade balance must be and will be balanced, and that that will mean a lower standard of living. It is very hard to make people understand that when they see unemployment has kind of gone down a little more. I think that the figures I see that are so graphic when you see, in the 8 million new jobs that we created in the last 5 years, over 60 percent of them are paying less than $7,000 a year.

We are losing those high middle income jobs. And that's what you and I all kind of maintain our standard of living on, the fact that there is that kind of money in circulation. So making less than $7,000 a year, doesn't have to fill out an income tax return, they can't be part of the American dream, they can't own a home on that kind of money. In effect, they are eligible for all kinds of

Government programs. We would just be a society of serving hamburgers if we keep that up.

What do you see other immediate steps we can take now; and what would you like to see as part of the items in this growth budget? We are going to talk about how we encourage more math and science and some other areas like that, but I would like to have your input.

Dr. BOYD. Well, first I would like to second Mr. Augustine's recommendation on the semiconductor. I think we have to prototype the problems we have to face up to.

I would also like to point out that the quality for what he said is we start putting centers of excellence in universities there is another problem. Over 60 percent of the graduate students in those universities are now foreign students. So that alone does not solve the problem.

I think there has to be a further consideration of how we transfer that technology, that science from the universities effectively and quickly, as you pointed out, in the industry, and we have lost that to some extent.

I think that if we do that throughout that complete chain from education to transfer, we would not generate some of the growth we referred to.

There is one other thing that I believe that must be addressed, though, quickly, and that is this international debt I am referring to. But, that is accumulating every year. If we have another $140, $150 billion this year, we are well on our way to that trillion dollar debt. And if you allow that to happen, growth is going to be harder and harder to come by.

Chairman CHILES. I happen to think that operating on the fiscal budget is the most important thing you can do, single item on the international debt. There are a lot of other items that you see, open markets, productivity and all of those other things. If we don't get interest rates down and we don't get the dollar down on a good basis rather than forcing it down by saying how weak we are, we still will have a hard time.

Dr. BOYD. Let me just say in conclusion, I think that we have built our society where it is today in the last 50 years with technology as a primary driving force. And I think anything we can do to reestablish that and to support is going to have a positive influence. It does not guarantee the solution, but without it I think it would be very difficult.

INVESTMENTS NEEDED TO REGAIN COMPETITIVENESS POSITION

Chairman CHILES. Let me just ask you both quickly if you could look further out to the future a little bit and tell me what investments do you think we need to be making now to regain that competitive position and hold it where we have leads in the future.

Mr. AUGUSTINE. I would start out and single out one area, and that is the area of manufacturing technology. Not related to any one industry, but across the board.

In this country we have been preeminent in research, we have been preeminent in innovation, and we still have very strong positions in those areas. As you yourself mentioned a few moments earlier, they read the articles from our technical journals from our universities, and our universities, incidentally, are still preeminent in the world. But they read those articles and they put them in commercial products more correctly than we do, and they wind up with the jobs, and the reasons we have not been effective at the manufacturing area and converting the innovation into things you can sell.

Chairman CHILES. I know you are familiar with the little small projects that we are funding with the National Bureau of Standards, and working on some of that in the future, and that's in a cooperative effort again with the private industry putting some funds in it, too. You are talking about going forward with programs like that.

Mr. AUGUSTINE. Absolutely. I fear that in this country, manufacturing has become a second class citizen, that in universities a person who studies industrial engineering has, for too long, been viewed as second class citizens. In Japan exactly the opposite is true. We need to rectify that balance. I see that when it is not personally an individual with a great deal of manufacturing. I think that's where the difference lies, and that's what we need to focus on in the long term.

Dr. BOYD. First, I would second that that may be the top priority.

On the other hand, I think that we are doing some things that are detrimental to our objective. I think that if we are going to use national policy to encourage things, we must continue to encourage research, development and the creation of new ideas and new techniques. Manufacturing will make us competitive to some extent, but we obtained our position in the world by being the creators of technology and the innovators of technology.

In our present tax bill, for example, it was a step backwards, in that regard. I think that we must again re-examine and put in proper perspective the role of technology in our society.

Chairman CHILES. Well, we thank you both again very much for your inconvenience. I know you both are very busy.

Mr. AUGUSTINE. Thank you, Mr. Chairman.

Dr. BOYD. Thank you, Mr. Chairman.

Chairman CHILES. Our next panel will be made up of members from the space industry, Mr. George B. Merrick, Vice President of Engineering and Mission Analysis of North American Space Operations, Rockwell International; Mr. Charles Ordahl, the Vice-President of McDonnell-Douglas Astronautics Company; Joseph Zimonis, Vice President for Rocket and Small Gas Turbine Engineering, with Pratt & Whitney; Mr. J.T. Oplinger, the Vice President of Lockheed Space Operations here from Titusville.

We thank each of you for coming and being here this morning. We will get statements from each of you and then we will have a few moments to ask questions.

Each of your full statements, if you have one, will be printed in the record, and if you could shorten those for us it would be helpful to us.

Mr. Merrick, we will start with you.

STATEMENT OF GEORGE B. MERRICK, VICE PRESIDENT, NORTH AMERICAN SPACE OPERATIONS, ROCKWELL INTERNATIONAL

Mr. MERRICK. Thank you, Mr. Chairman. I would like to review initially where we are coming from and where Rockwell's background is. We have been extensively involved in the Nation's space program for over 25 years. We were the prime contractor for the Apollo command and service modules, for the Saturn second stage, and for all the Saturn engines. Our participation in the Space Shuttle program has been equally extensive. We are fundamentally headquartered in California, but we do have a significant presence here in Florida.

We have been here for up to 35 years. I was in conversation with Mr. Al Martin, who is in the audience today. His first duty here in Florida started in 1955, and they have been here since that time.

But at the outset of my statement, Mr. Chairman, I want to reflect on the forward thinking challenge set forth by the President. I quote, "Space exploration is part of the human adventure. Through it, we challenge ourselves to strive and to achieve. By exploring, we are not just finding out more about our physical environment, we are finding out more about the human condition."

It is not a matter of if we explore and develop the boundless frontier of space. The real question is when and who. In this relatively new era of space development, opportunities abound for creative minds in science and industry. NASA's vision is to be highly commended with its sharp focus on the human spirit's desire to discover, to explore and to understand. NASA's overarching goals are to achieve advances in knowledge through space sciences, and the exploration of the solar system.

In addition to the strong human inclination to reach out and explore, there are other fundamental motivations for doing things in space that will improve the human condition on earth. Space systems, using the unique space perspective and the orbital environment, have demonstrated improved productivity on Earth and offer better living standards to its people.

National objectives include broad access to information, worldwide inexpensive communications and navigation, understanding of processes in zero-gravity, and Earth monitoring coupled with the basic and applied sciences that improve our productivity and stewardship of planet Earth.

AMERICA'S LEGACY TO LEAD BEING CHALLENGED

The American legacy to lead and explore this new frontier is being severely challenged. Other national entities are aggressively moving into space. The Soviet Union, Europe, Japan, China and others have major investments in place or planned.

To turn now from continued development of our space infrastructures would severely restrain the U.S. civilian space program in this rigorous competitive environment, leading to domination by other nations in areas vital to our standard of living and national security.

The Space Station will be our gateway to the universe, our foothold in outerspace and the centerpiece of America's space infrastructure for the next decade. The Space Station will be a top notch research facility for both the private and government communities. It will be an observatory, a natural laboratory of pure vacuum and microgravity, and a center for the development of new technologies, materials, and life science investigations. Moreover, the Space Station can be a powerful stimulus to the private sector for development of commercial space initiatives.

Considering the Nation's space transportation needs, a robust mixed fleet is considered fundamental to achieve an effective program of near term and long range space development. In conjunction with the Space Shuttle, Expendable Launch Vehicles are appropriate to maintain U.S. space leadership, providing assured access to space. The effectiveness of our current capability with the constraints of a three Orbiter fleet is significantly diminished. The timely return to flight of the Shuttle system and construction of a replacement Orbiter are especially pivotal to satisfying our space program priorities.

CIVIL SPACE TECHNOLOGY INITIATIVE

NASA's recommended Civil Space Technology Initiative which concentrates on advanced technologies is crucial to the accomplishment of future U.S. missions. The focused research and development of specific technologies such as advanced propulsion, aerothermodynamics, and materials are vital to support the Nation's current and future space infrastructure development, as well as the development of technologies for conducting significant work in the space environment.

If we do not move forward to ensure that the United States maintains its Business-Higher Education Forum stated in a white paper on space enterprise, "America's steel, automobile, consumer electronics and clothing industries all have been victimized by overseas competition and the U.S. lead is threatened in several other areas of commerce. It is ironic that the Nation that has made the greatest contribution in space technology to the world should now be in danger of losing that lead as well."

The space program offers the potential for continued economic growth and industrial development in the emerging world market areas supported by space systems and technologies.

Without strong Federal Government support in these critical formative years, the lead will once again go to our determined overseas competitors.

PUBLIC SUPPORTS SPACE PROGRAM

A strong and stable foundation of public confidence and approval has characterized the private sector's response to space exploration. Since the *Challenger* accident independent surveys have reaffirmed even stronger public support. Market Opinion Research's survey in September 1986 reported the following:

Seventy percent approval of U.S. space program.

Over 80 percent approval of continuing manned space flight, recognizing there will always be some risks.

Over 50 percent oppose cutting NASA's budget, 60 percent approve spending whatever is necessary to maintain space leadership, even to 1 percent of the Federal budget.

Over 75 percent approval of Space Station and unmanned planetary exploration as current space goals.

In another national survey, results from the Public Opinion Laboratory at Northern Illinois University in February 1987 showed that the net effect of the *Challenger* accident was a strong increase of public sentiment in favor of the space program generally and the Shuttle program in particular. Reinforced public support was likewise evident in national post *Challenger* accident surveys by ABC, CBS and USA Today.

Mr. Chairman, the American people are emphatic in their desire to see America remain preeminent in space technology. This cannot be accomplished with a national space program budget that has declined by 50 percent in purchasing power in the past 20 years, while other budgetary areas without the economic growth potential of space have increased by up to 20 times their 1965 levels.

The challenge of our Nation's space program future is ours. While the opportunity exists for rapid and meaningful space development advances, it is a time of increasingly intense international competition across the full spectrum of space program disciplines. I concur with Jim Fletcher, NASA Administrator, who stated that it is vitally important that the United States meet the international challenge and maintain its leadership in Aero-Space technology. We need to press forward and cannot leave the tasks to others.

Thank you for the opportunity to speak to you today.

Chairman CHILES. Thank you, sir.

[The prepared statement of Mr. Merrick follows:]

STATEMENT OF

GEORGE B. MERRICK
VICE PRESIDENT
NORTH AMERICAN SPACE OPERATIONS
ROCKWELL INTERNATIONAL

BEFORE THE
FIELD HEARINGS OF

THE SENATE BUDGET COMMITTEE

MARCH 9, 1987

Mr. Chairman. My name is George B. Merrick. I am vice president of Rockwell International Corporation's North American Space Operations, headquartered in El Segundo, California. I have technical cognizance for programs and products which cover a wide range of high technologies and which are space and energy related.

Rockwell has been extensively involved in the Nation's space program for over 25 years. We were the prime contractor for the Apollo command and service modules, for the Saturn second stage, and for all the Saturn engines. Our participation in the Space Shuttle program has been equally extensive. Our Space Transportation Systems Division, headquartered in Downey, California, builds the Space Shuttle Orbiters and assists NASA with Orbiter operations, mission operations, and cargo and system integration. Rockwell's Rocketdyne Division, headquartered in Canoga Park, California, builds the Space Shuttles main engines.

At the outset of my statement, Mr. Chairman, I want to reflect upon the forward thinking challenge set forth by the President. "Space exploration is part of the human adventure. Through it, we challenge ourselves to strive and to achieve. By exploring, we are not just finding out more about our physical environment, we are finding out more about the human condition."

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The American legacy to lead and explore this new frontier is being severely challenged. Other national entities are agressively moving into space. The Soviet Union, Europe, Japan, China and others have major investments in place or planned.

To turn now from continued development of our space infrastructures would severely restrain the U.S. civilian space program in this rigorous competitive environment, leading to domination by other nations in areas vital to our standard of living and national security.

The Space Station will be our gateway to the universe, our foothold in outerspace and the centerpiece of America's space infrastructure for the next decade. The Space Station will be a top notch research facility for both the private and government communities. It will be an observatory, a natural laboratory of pure vacuum and microgravity, and a center for the development of new technologies, materials, and life science investigations. Moreover, the Space Station can be a powerful stimulus to the private sector for development of commercial space initiatives.

Considering the Nation's space transportation needs, a robust mixed fleet is considered fundamental to achieve an effective program of near term and long range space development. In conjunction with the Space Shuttle, Expendable Launch Vehicles are appropriate to maintain U.S. space leadership, providing assured access to space. The effectiveness of our current capability with the constraints of a three Orbiter fleet is significantly diminished. The timely return to flight of the Shuttle system and construction of a replacement Orbiter are especially pivotal to satisfying our space program priorities.

NASA's recommended Civil Space Technology Initiative which concentrates on advanced technologies is crucial to the accomplishment of future U.S. missions. The focused research and development of specific technologies such as advanced propulsion, aerothermodynamics, and materials are vital to support the Nation's current and future space infrastructure development, as well as the development of technologies for conducting significant work in the space environment.

If we do not move forward to ensure that the United States maintains its leadership, foreign competitors are certain to fill the vacuum. Recently, the Business-Higher Education Forum stated in a white paper on space enterprise, "America's steel, automobile, consumer electronics and clothing industries all have been vicitimized by overseas competition and the U.S. lead is threatened in several other areas of commerce. It is ironic that the Nation that has made the greatest contribution in space technology to the world should now be in danger of losing that lead as well."

The space program offers the potential for continued economic growth and industrial development in the emerging world market areas supported by space systems and technologies.

Without strong federal government support in these critical formative years, the lead will once again go to our determined overseas competitors.

A strong and stable foundation of public confidence and approval has characterized the private sector's response to space exploration. Since the Challenger accident independent surveys have reaffirmed even stronger public support. Market Opinion Research's survey in September 1986 reported the following:

- Seventy percent approval of U.S. space program.
- Over eighty percent approval of continuing manned space flight, recognizing there will always be some risks.
- Over fifty percent oppose cutting NASA's budget, sixty percent approve spending whatever is necessary to maintain space leadership, even to one percent of the Federal budget.
- Over seventy-five percent approval of Space Station and unmanned planetary exploration as current space goals.

In another national survey, results from the Public Opinion Laboratory at Northern Illinois University in February 1987 showed that the net effect of the Challenger accident was a strong increase of public sentiment in favor of the space program generally and the Shuttle program in particular. Reinforced public support was likewise evident in national post Challenger accident surveys by ABC, CBS and USA Today.

Mr. Chairman, the American people are emphatic in their desire to see America remain preeminent in space technology.

This cannot be accomplished with a national space program budget that has declined by 50% in purchasing power in the past twenty years, while other budgetary areas without the economic growth potential of space have increased by up to 20 times their 1965 levels.

The challenge of our Nation's space program future is ours. While the opportunity exists for rapid and meaningful space development advances, it is a time of increasingly intense international competition across the full spectrum of space program disciplines. I concur with Jim Fletcher, NASA Administrator, who stated that it is vitally important that the United States meet the international challenge and maintain its leadership in aerospace technology. We need to press forward and cannot leave the tasks to others.

Thank you for the opportunity to speak to you today and I will be happy to answer any questions you may have for me.

Chairman CHILES. Mr. Zimonis, we will take your statement now.

STATEMENT OF JOSEPH ZIMONIS, VICE PRESIDENT FOR ROCKET AND SMALL GAS TURBINE ENGINEERING, PRATT AND WHITNEY

Mr. ZIMONIS. Mr. Chairman, thank you for inviting me on behalf of the United Technology for Pratt and Whitney to appear before you this morning.

As a brief background, our company has been a leading designer and developer of prime systems and technology since 1958. We developed here in Florida the world's first liquid hydrogen rocket engine, the RM10, which has performed flawlessly for more than 20 years. We developed technology for segmenting large solid rocket boosters used on both the Titan launches and the Space Shuttle.

Most recently we have been awarded the NASA contract for developing alternate turbo pumps for the Space Shuttle main engines. Our company is investing more than $40 million in liquid rocket components test facilities to support this program.

TEAM EFFORT NEEDED TO DEVELOP SPACE PROGRAMS

We believe that America must act quickly and decisively to pull together a space program or risk losing its age in space. Europe, Japan, China, and of course the Soviet Union are making a significant gain that are eroding America's position of leadership.

We need a team effort. Priorities must be established for essential programs as the Space Station, the Space Shuttle recovery, the Shuttle drive vehicle, the heavy lift launch vehicle, the range of expendable launch vehicles, and the national Aero-Space plane. We must avoid duplication and optimize the use of our resources.

SPACE STATION CRITICAL TO RESEARCH

We support increased investment in space science and research programs. In fact, we view the increased investment as a national imperative. We have data, for example, that shows in a space-based environment of zero-gravity an extremely high vacuum. We can manufacture substances that either cannot be produced on earth; or if produced, are deficient in quantity and quality. We cannot complete this research without a functioning space transportation system space station. Consequently, we strongly support the space shuttle recovery program. We need the Space Shuttle as a key ingredient of our national space transportation system.

The Soviet Union has spent many years on its space station, while we have been reduced to debating whether or not we need one. Without the space station as a launch platform for further space exploration, our knowledge of the universe may be severely constrained. Without the Space Station as a large zero-gravity laboratory and factory, significant medical, materials and manufacturing technology may be denied to the United States and mankind. Indeed, without the space station, our country could be greatly weakened.

The major problem is how to reduce costs associated with building a Space Station. A large step toward a solution would be a heavy lift launch vehicle incorporating the latest engineering and manufacturing technology designed specifically to provide low cost access to space.

We urge the Senate Budget Committee to examine the fiscal year 1987 heavy lift launch vehicle funding of only $12 million, and seriously give consideration to increasing it. We are convinced that America's Aero-Space industry can produce the heavy lift launch vehicle before 1995. Specifically, we have developed technology that can provide high performance, reliable, low cost, and easily maintainable systems within the available time.

Pratt and Whitney, as well as United Technology Space Transportation Division, are vigorously engaged in studying space compulsion and other systems for the future. We have undertaken an effort to design a compulsion system for the national Aero-Space plane. This concept uses our expensive turbo machinery and combustion experience.

We are certain, however, that our competitors and adversaries are doing the same thing. For those who succeed, this research will spin off many areas of valuable technology.

We also support NASA's civilian space technology initiative, and its quest for better booster technology. We encourage funding in the compulsion area now to provide performance and low cost benefits that will ensure America's competitive edge in the future. We believe the window of opportunity is open for America to regain its leadership in space. We need the concerted actions of both industry and Government to move ahead before this window closes.

Thank you.

Chairman CHILES. Thank you, sir.

Mr. Ordahl?

STATEMENT OF CHARLES ORDAHL, VICE PRESIDENT, SPACE STATION PROGRAM, McDONNELL DOUGLAS ASTRONAUTICS CO.

Mr. ORDAHL. Thank you very much for this opportunity to represent McDonnell Douglas to provide you with a few views on the expendable launch vehicles and the Space Stations.

As has been mentioned earlier, our key element in revitalizing our launch capability is the recent Air Force contract for the medium launch vehicle, which was awarded in January. The MLV program, now designated the Delta II, is well underway toward the planned first launch for the Air Force GPS program in 1988. This initial contract is for seven launches with two follow-on options for seven and six launches, respectively.

The program also provides a foundation upon which a companion to commercial launch vehicle service in the United States can be built.

GOVERNMENT/INDUSTRY RELATIONSHIP NEEDED

As our world becomes more internationally competitive, stronger Government-industry relationships are increasingly important. The current efforts to rebuild a national ELV program and to facilitate the commercial ELV industry is certainly an excellent step. However, this partnership is still relatively weak, considering the risks involved and the wide range of the international government supported competition, including the European consortium Arianespace, the Chinese, and even Russia.

Much has been done to reduce concerns related to the production start-up costs and certain uprating investments; however, there still remains substantial additional risks and unknowns, including government support costs, high insurance costs, flight failures, liabilities, foreign competitor flexibility on pricing and financing, and even government policy shifts. U.S. industry is moving forward in spite of these risks, competing in the international market.

COMMITTED TO COMMERCIALIZATION

McDonnell Douglas is committed to the commercialization of its Delta and Delta II programs, and is currently—at the present time, we have six reservations for available launch slots in late 1988 and beyond. Negotiations are currently in process with the DOD and with NASA to provide for the use of the government facilities, equipment and launch support necessary to accomplish these commercial launches, as well as to clarify certain liability responsibilities. Completion of these government negotiations will pave the way for finalization of the launch service agreements with our commercial customers.

Clear and steady government policy is especially important since these programs often take years to reach fruition. As an example, when McDonnell Douglas and NASA wrote an agreement in 1976 to provide for commercial development and launch the Payload Assist Modules from the Shuttle to carry communication satellites to higher orbits, the agreement did not include a specific written provision that the Shuttle will be available for these missions. It was simply assumed, as a matter of national policy, which was the case at that time.

Subsequent national policy shifts of this past year have now dramatically changed the remaining commercial opportunities for this program on the Shuttle. Industry understands there are large risks in these ventures. But care must be taken to minimize policy shifts as one of them if we are to gain the full benefits of this potential.

SPACE STATION CRITICAL TO SPACE LEADERSHIP RECOVERY

Now, some comments on the Space Station. The Space Station, combined with a healthy launch capability, completes the near earth space infrastructure required to maintain or possibly regain the U.S. leadership in space. It can be described as a multi-purpose industrial park in space to support research, development and manufacturing activities. The Station forms a critical link in meeting the near term objective of supporting space science, technology and commercialization, as well as the longer range goals set forth by the National Commission on Space.

NASA, with considerable industry support, has spent the last 2 years in an extended definition of a Space Station design which provides a permanent, manned presence in space by the mid 1990s. They have studied the architecture, cost, international participation, management and operations, and have arrived at a balanced complete program that satisfies the many requirements.

While the NASA cost estimates for the Space Station are now greater than previously estimated, the capability provided by the NASA selected configuration will allow the United States to be competitive with the rest of the world in the space activities and benefits. The investment should be viewed in the perspective of the long term benefits of the Nation.

Finally, the U.S. industry teams that have been supporting NASA in the definition of the Space Station for the past 2 years are ready to proceed with the program.

There is, in my opinion, no advantage to either the U.S. Government or industry to further delay releasing the Phase C/D request for proposals. I would recommend that NASA be allowed to proceed with the release of the RFP's and let the selected industry teams work with NASA and the Congress on accommodating any further adjustments that might be required to meet programmatic, technical, or annual funding requirements.

Thank you very much.

Chairman CHILES. Thank you, sir.

[The prepared statement of Mr. Ordahl follows:]

March 9, 1987

SENATE BUDGET COMMITTEE HEARING
ON
SPACE POLICY

C. A. ORDAHL
VICE PRESIDENT DEPUTY GENERAL MANAGER
SPACE STATION PROGRAM
MCDONNELL DOUGLAS ASTRONAUTICS COMPANY

OPENING STATEMENT

Mr Chairman, and members of the Committee, I would like to thank you for this opportunity to represent McDonnell Douglas in providing some of our views on Expendable Launch Vehicle and Space Station Issues.

EXPENDABLE LAUNCH VEHICLES

The flight failures of last year have made it clear that the Nation needs a stronger, more resilient space transportation capability including a mixed fleet of both manned Shuttles and unmanned Expendable Launch Vehicles (ELV's). A key element in revitalizing our launch capability is the recent contract for the Air Force Medium Launch Vehicle (MLV) which was awarded in January. The MLV Program, now designated Delta II, is well underway toward a planned first launch for the AF GPS Program in late 1988. The initial contract is for 7 launches with two follow-on options for 7 and 6 launches respectively. Plans now call for production of Deltas with geo-transfer orbit capabilities ranging from 2830 lbs for the basic Delta to 3560 lbs for the Delta II with an option for an increased capability to 4010 lbs. The program also provides a foundation upon which a companion commercial launch vehicle service in the United States can be built.

As our world becomes more internationally competitive, stronger goverment/industry relationships are increasingly important. The current efforts to rebuild a national ELV program and facilitate a commercial ELV industry is certainly an excellent step. However, the partnership is still relatively weak considering the risks involved and the wide range of international government supported competition including the European consortium - Arianespace, the Chinese and even the U.S.S.R. Much has been done to reduce concerns related to production start-up costs and certain uprating investments, however, there remain substantial additional risks and unknowns including goverment support costs, high insurance costs, flight failures, liability, foreign competitor flexibility on pricing and financing, and even government policy shifts. U.S. industry is moving forward, in spite of these risks, to compete in the international market. McDonnell Douglas is committed to commercialization of its Delta/Delta II Programs and we currently have six reservations for available launch slots in late 1988 and beyond. Negotiations are in process with the DOD and NASA to provide the goverment facilities, equipment and launch support necessary to accomplish these commercial launches as well as to clarify liability responsibilities. Completion of these goverment negotiations will pave the way for finalization of launch service agreements with our commercial customers.

Clear and steady goverment policy is especially important since these programs often take many years to reach fruition. As an example, when McDonnell Douglas and NASA wrote the agreement in 1976 to provide for commercial development and launch of Payload Assist Modules from the Shuttle to carry communication satellites to higher orbits, the agreement did not include a specific written provision that the Shuttle be available for these missions. It was simply assumed as a matter of national policy, which was the case at that time. Subsequent national policy shifts this past year have now dramatically changed the remaining commercial opportunities for this program on the Shuttle. Industry understands there are large risks in these ventures, but care must be taken to minimize policy shifts as one of them if we are to gain the full benefits of this potential.

SPACE STATION

The Space Station, combined with a healthy launch capability, completes the near earth space infrastructure required to maintain (or regain) the U.S. leadership in space. The Space Station can be described as a multi-purpose industrial park in space to support research, development, and manufacturing activities. The Station forms a critical link in meeting the near term objective of supporting space science, technology and commercialization, as well as the longer range goals set forth by the National Commission on Space.

NASA, with considerable industry support, has spent the last two years in an extended definition of a Space Station design which provides a permanent, manned presence in space by the mid 1990's. They have studied the architecture, cost, international participation, management and operations and have arrived at a balanced program to satisfy the many requirements. The Space Station configuration that has been selected by NASA also provides the proper balance of capabilities such as that associated with laboratories for zero gravity research and development and science missions associated with payloads mounted on the Space Station for both earth and stellar viewing. As you are aware, the Soviet Union is operating their MIR space station with two cosmonauts carrying out similar research and development activities even as we speak.

While the NASA cost estimates for the Space Station are now greater than previously estimated, the capability provided by the NASA selected configuration will allow the U.S. to be competitive with the rest of the world in space activities and benefits. The investment should be viewed in the perspective of long term benefits to the Nation.

Finally, the U.S. industry teams that have been supporting NASA in the definition of the Space Station for the past two years are ready to proceed with the program. There is, in my opinion, no advantage to either the U.S. Government or industry to further delay releasing the Phase C/D RFP's. I would recommend that NASA be allowed to proceed with the release of the RFP's and let the selected industry teams work with NASA and Congress on accommodating any further adjustments that may be required to meet programmatic, technical or annual funding requirements.

Thank you for inviting me to appear before you today.

Chairman CHILES. Mr. Oplinger.

STATEMENT OF J.T. OPLINGER, VICE PRESIDENT, LOCKHEED SPACE OPERATIONS CO.

Mr. OPLINGER. Mr. Chairman, I very much appreciate the opportunity to testify before you this morning.

I represent the Lockheed Space Operations Co., which is a division of the Lockheed Corp.

Lockheed Space Operations Company, or LSOC, as we are known here on the Space Coast, is NASA's Shuttle processing contractor. And together with our teammates of Grumman Technical Services, Inc., Morton Thiokol, Inc., and Pan American World Services, we are responsible for the ground processing of the Shuttle.

In 1983, we were awarded a 3-year contract with provisions for another 3-year price option period, and three additional 3-year unpriced options, making a total potential of a 15-year contract.

The value of the first 3 years was approximately $1.3 billion. We completed the initial contract in December 1986. And NASA has exercised their option for the priced option contract, and we are currently in that phase today.

We are doing the job safely and efficiently; however, even so, we know there is always room for improvement, and we continually strive to improve the operations and position ourselves to be able to respond to the dynamic program environment.

We consider, by a wide margin, that our work force is the most important element in our operation. Right now we employ some 5,000 highly experienced and well-trained individuals.

We think this work force is truly a national asset, and we focus a great deal of management interest and attention on enhancing their capabilities to ensure the Nation's space program receives the full benefit from the individual and selective skills and talents from this remarkable group of people.

Certainly, we were all shaken and deeply saddened by the loss of the *Challenger* and its crew. We felt that loss as if we had lost a member of our families. But even in the midst of the sadness, NASA and alternate contractors have resolved to put their shoulders to the wheel and make the Space Transportation System stronger and safer than ever.

And since last year we have been very busy accomplishing much needed work, such as modifying the orbiters, up-grading the ground support equipment, and reviewing all our systems and procedures, and up-grading as necessary. We have also utilized that down time to retrain and cross-train our personnel so that we can improve our surge capabilities.

SHUTTLE HIATUS CAUSES ECONOMIC HARDSHIP

Because of that hiatus in the Shuttle launches, we had two major layoffs last year which reduced our work force by about 20 percent. We did select individuals for the layoff based on seniority so we were able to retain the more experienced people. And in addition to that, we launched a service to help get the laid-off people placed in other Lockheed companies.

Still, the layoff has really hurt the local economy. Car sales and new home construction slowed down. The commercial construction was hurt badly, but we are happy to say things are beginning to look up now. We are approaching rapidly the time when we begin to process slow to prepare the Discovery for the upcoming SDS 26 mission.

We are beginning to recall some of the people who we laid off last year, and it gives us a great feeling to see some of these people coming back to work at the Kennedy Space Center.

The mood at the Kennedy Space Center is definitely upbeat, the morale is high, and we are ready, willing and eager to get the Shuttle up and flying again. And I think everyone associated with the Shuttle program realizes how high the stakes are in terms of crucial national defense contributions, in terms of the essential role the Shuttle must play in building the Space Station, in terms of the potential and advantages of technology and astronomy, and in terms of the incalculable impact, the success the Shuttle program can have on national products, confidence and motivation.

We think that good people will continue to be a key to a successful space program. We work very closely with the colleges and universities, especially those in our central Florida area, and we are confident they are giving the young people the kind and caliber of training that a viable space program needs and will need in the years to come.

Also, Lockheed Corporation is deeply committed to the Nation's space programs, with full support, and are participating in national space observatory programs, astrophysics. Out in California, we have been trying the Hubble Space Telescope for awhile, and in orbit, this marvelous instrument will enable our experimenters to peer into outer space seven times further than ever before.

The U.S. space program represents another advancement in the exploration of the solar system, and will provide a basis for other scientific and technical endeavors. Lockheed believes the space program is the next logical step, and Lockheed is a keen participant.

The Space Station is also important because it will maintain U.S. leadership in space for the decade of the 1990s and beyond. Here in Florida, in the first part of the next decade, we can expect even greater accomplishments for the Space Shuttle. For example, we will launch 11 missions in 1990, and about that same number in 1991.

These missions will place into orbit a wide variety of commercial and Department of Defense payloads. And I would expect that producing, assembling and processing these payloads for flight will further develop a considerable associated business activity in the area.

In the early 1990s, our Shuttle processing contract work force will likely grow to some 7,000 people to accommodate the higher launch rate.

These are really exciting times for us in the space program, and we welcome the opportunity to tell you about our mission here today.

Thank you very much.

Chairman CHILES. Thank you, sir.

DEVELOPMENT AND COST OF SPACE STATION

Mr. Merrick, Rockwell is heavily involved in our Space Station development. I would like to get your ideas on how you can see the program developing and your assessment of what you think it is really going to cost us to build and operate a manned space system, and whether or not we should be using that combination of Shuttles and the heavy lift vehicle to structure the Station.

Mr. **Merrick**. We have supported NASA in their definition of activity, including cost itself. Primarily, in a limited scope area, the power system and the architecture structure and some of the distributor systems, Johnson Space Center and Louis Research Center in Cleveland.

As a result, we fundamentally kind of had an overall picture of the total cost, and, as I say, only support NASA in that. And I would say the fundamental source of the real economics associated with development of an operation really should come from NASA.

The worst thing we could do would be to fool ourselves into thinking that there was a way of paring down—and I will use the words short-change in the context of well-defined, which is, I think, fundamentally what NASA's doing right now—well-defined, well-structured, properly considered program, and reasonably well-estimated with some reserve for the flexibility that's required. That's the right way to go, because I have seen programs before and I was very closely associated with the——

Chairman **Chiles**. Well, the other worst thing you could do is keep sort of saying the cost is going to be one thing when you know those costs are going to be higher. That's the way to lose support in the Congress, and the country maybe, saying you have got something that is going to cost $6 or $8 billion when you know it is going to be double that.

I think the sooner that you have your cost out there you can attempt to justify those, but don't fool us when you know the costs are going to be higher.

Mr. **Merrick**. Mr. Senator, the other side of the coin that I was describing was that side. There is no question about the fact that you cannot get glib about the fact that these programs need to be well-defined and pinned down and well-described. And I think NASA is very actively attempting to do that. And we are supporting, along with all our other definition contractors, are supporting that effort. And I think they are very close to doing that.

I guess my only reaction would be that I think it would be very unrealistic to, in an unthought through way, to just kind of slash that activity. I think they are working very hard to get a good definition program, and I think it will turn out well.

Just a comment about the HLV and the launch systems as it relates to the Shuttle. I am sure there is a very fundamental useful part that both manned and unmanned transportation systems can participate in the deployment and support of the station. I think the timing of the availability of launch systems has to be really understood to understand how those capabilities will play in the early, mid-term and later activities with respect to the station activities.

Mr. CHAIRMAN. Well, I don't know, Mr. Oplinger, whether you or Mr. Ordahl will have anything to add that you might give me on that.

Mr. ORDAHL. I think basically I generally agree with the comments made. I think that pretty well covers it.

Mr. OPLINGER. I have nothing.

Mr. CHAIRMAN. Mr. Oplinger, you said you looked forward to the time you started to rehire some people.

Can you give me anything more definitive on that? Do you have a schedule now of when you are building up the work force?

Mr. OPLINGER. Yes, we do. As a matter of fact, we are already in a rehire mode. We have recalled several of the technical work force, and some of the technical people from the local area. So, we are in that planned build-up phase now, and we will continue that way through the next year or two.

Chairman CHILES. What do you anticipate that you are going to rehire within the next year? How many people?

Mr. OPLINGER. We will probably increase our work force about 2000 people over the next—by 1990. We are currently around 5,000. We will probably go to about 7,000.

Chairman CHILES. So, you are going to go to from 5,000 to 7,000 by 1990. How do you see that building up? How much of that will take place in 1988?

Mr. OPLINGER. Probably in 1988 I would guess nearly a thousand people additional.

Chairman CHILES. So, you would be hiring some more people in this year and then another thousand?

Mr. OPLINGER. Yes; we are continuing to hire at a steady rate throughout this year, and also in 1988.

Chairman CHILES. We are happy to hear that.

Mr. OPLINGER. So are we.

NATIONAL AERO-SPACE PLANE

Chairman CHILES. Mr. Zimonis, Pratt & Whitney has been heavily involved in the development of our National Aero-Space Plane. I understand that you have made some remarkable breakthroughs.

Tell us how you see the program growing, and whether or not that Aero-Space plane is going to lay the groundwork for the next general Space Shuttle.

Mr. ZIMONIS. Well, you are right. We are on the verge of several significant break-through developments. We are entering into the studies on the National Aero-Space Plane.

However, as you know, that program is quite highly classified and I can't elaborate too much on it here today.

But I would see it as a vehicle for laying the foundation for future transportation systems. In order to make a space plane work as it is envisioned, several significant advances of technology must be developed concurrently. And those advances will certainly spin off into any other form of transportation that's required somewhere past the year 2000.

Chairman CHILES. Are we spending enough for the development phase now in research?

Mr. **Zimonis**. I guess I should reserve comment on that, sir. It is, again, somewhat sensitive with the Air Force and NASA, and I think it would be up to them to make any comments as to whether or not there is enough money being spent.

Chairman **Chiles**. The goal of the national Aero-Space Plane is to provide very low-cost lift capacity.

Do you think we have some real reason to look forward to getting payloads into orbit at less than 20 dollars a pound?

Mr. **Zimonis**. At less than 20 dollars a pound?

Chairman **Chiles**. Yes, sir.

Mr. **Zimonis**. My personal opinion is that that's very, very inexpensive. I don't think we could get that low.

Chairman **Chiles**. You don't see that happening right now, even though that's in the Air Force and NASA's goal?

Mr. **Zimonis**. That's the Air Force and NASA's goal for the future. I think we have got some ways to go. It might be obtainable.

DELTA II VEHICLE

Chairman **Chiles**. Mr. Ordahl, NASA and McDonnell Douglas recently won the Air Force contract to build the new Delta II vehicle.

Tell us about that system, what it is capable of.

Mr. **Ordahl**. Well, sir, the Delta II is an outgrowth of the basic Delta launch vehicle. In fact, it incorporates most all of the improvement systems of the Delta, and is flying here at the Cape for us today.

The Air Force did require some additional lift capability, and some additional increase in the size of the payload preparing for the ETS program, and so there were several technical changes to the vehicle, or will be. One is the increase the bearing size to 9.3 feet. The other is to increase the propulsive capabilities of the solid rocket thrust operative in the first stage, and some other relatively minor improvements of the Rocketdyne engine that's used on the first stage.

COMMERCIAL CAPABILITY OF DELTA II

Chairman **Chiles**. I would like to also get your assessment of the commercial capability or capacity probability of Delta II, and what is that going to mean for the Cape, if you can tell us.

Mr. **Ordahl**. Well, I think it is very good, actually. I do think we have a vehicle that's well suited to picking up quite a few of the payloads which were removed from the Shuttle on the basis of the policy change that we discussed earlier.

There are a number of those missions who are currently waiting for launch. And if we had the vehicles available today I think we could proceed immediately. As it turns out, of course, we do still have to build those vehicles so that the earliest launch would take place in, lets say, late 1988, and then subsequent, of course, in 1989 and 1990.

So, we are quite confident that these will take place. We are still trying to work out diligently with the Government agencies to get in place certain agreements that are required in order to proceed completely.

Chairman **Chiles**. How would you compare Delta II, when you get it ready, with the French Arion or the new Japanese ELV? Will it be able to compete with them and what they are doing?

Mr. **Ordahl**. Well, I would hope so. And I believe that we certainly will be able to compete.

Now, again, this gets to the point of fact that both the Arion and the Japanese vehicle, or the Chinese vehicle are basically government-supported programs, and they have sort of quasi-government commercial arrangements in order to compete in the world marketplace. And so, the real competitive situation often depends upon what position those particular competitors take with regards to how they——

STEPS NEEDED TO COMPETE

Chairman **Chiles**. Well, let me ask you this way: What steps—and I will ask you this or anyone else on the panel—what steps do we need to take so that we will be able to compete?

Mr. **Ordahl**. Well, I think there are several, certainly. As I mentioned earlier, some things that have been put in place, production lines, of course are very critical and important. The operating basically paid for by the Air Force, as I mentioned earlier. Those things have been put in place, and they are good.

Now, there still remains some issues, however; for example, liability. The question is to what is the financial liability, if you will, of a commercial operator operating on a government facility?

This has to be worked out in a fair amount of detail by the parties. For example, one of the positions that might be very nice if it could be put in place would be an interparty waiver of liability, since it is very similar to that which we have on the Shuttle when we flew the CAMS of the Shuttle, that is each party is responsible for its own equipment, and whatever happens we will take that as it comes. In other words, best efforts on the part of the people involved.

So, I think that's one thing, we need to work out a fair sharing of the risk, if you will, between the parties involved.

Another factor that's pretty important has to do with the cost of using the Government facilities. And as was mentioned earlier, the policy intent is, in fact, to have what is called direct charges or incremental additive charges over the government base.

If, in fact, we were able to achieve an agreement in which additive charges were in fact agreed to, that would be fine. However, when we get down into the detailed negotiation of these agreements, oftentimes we find a great deal of rules and regulations, and quite a bogging down of the process. And I am hopeful that this can be completed expeditiously. But oftentimes, we get into situations where it doesn't turn out as good as the high level policies had intended.

Chairman **Chiles**. Any comment on that from Rockwell or Lockheed?

CORPORATE INVESTMENT IN SPACE PROGRAM

All right. I would like to ask each of you if you will try to tell me what your corporations would be willing to invest in the national space programs, including Space Station developments. Also, what your corporate efforts would be to train young scientists, particularly the post-Challenger, and protect younger workers if those delays occur in these launching future systems.

ROCKWELL INTERNATIONAL

Mr. MERRICK. Let's go down the line.

Investments are an interesting and difficult concept to really consider. But I think we have made a significant investment for—our Space Station activity started in the early 1970s in the issue between the transportation system or the station, and we have invested—and I would not be able to define a number, but as much as we would in any major effort of that nature over a period of 25 years. And we are still doing it. And this is in facilities and discretionary resources, some of which we recover from the Government, and also our own bottom line funds that we do not recover essentially come out of profit.

So, our commitment to that program is extensive and similar to the activities of prior efforts of that nature.

RETENTION OF SKILLS DURING LAUNCH DELAYS

As it relates to the young engineers, we have a very conscious program fundamentally in our engineering departments, but exist throughout our elements and other functional elements of the company where we will acquire young engineers to put into the work force, and provide training to those. And our retention policies are strongly oriented to those younger engineers.

In fact, the bigger problem we have with young engineers—and to all their great credit—they get training in larger companies and find it interesting and important, perhaps, to their careers to leave and go on to smaller companies. And I feel that we have done them very well in that process, and I don't take that from them.

But as far as our ability to hold onto engineers, I would say our biggest problem is they, by their own volition, leave for other challenges.

Our retention policies for reduction in force very strongly favors the younger engineers, and that's been a very positive program. And it has allowed us to invigorate our technical work force and, as I say, other functions vary significantly by hanging onto the younger, very thoughtful and well-trained and well-motivated younger people that are coming out of our educational institutions.

Chairman CHILES. Mr. Oplinger?

LOCKHEED SPACE OPERATIONS

Mr. OPLINGER. We have got about the same kind of thing. And I want to address how much we are willing to invest in it. Because we have been, and are investing, and will continue to invest in such things as the Space Station program and so forth.

RETENTION OF SKILLS DURING LAUNCH DELAYS

But as far as the retention of skills, the great reductions and layoffs we had last year, that had to be of prime interest to us. And, of course, we make a great effort to retain these people in our other corporations and other companies in other corporations, and we have had very great success in relocating people from the east coast to the west coast and various other companies within the Lockheed and team member corporations.

It is a critical issue. The young people are very mobile today. They want interesting work. And when they are caught in an area where the work is not too interesting, their inclination is to move on to someplace else. It is a major issue with us, and we have put a lot of time and effort into trying to retain—finding ways to retain those people.

Chairman CHILES. Mr. Zimonis?

PRATT AND WHITNEY

Mr. ZIMONIS. Well, in terms of investment, I cannot give you specifics in terms of investing in specific space programs right here, although we could provide that information to your office.

But United Technologies Corporation, for instance, invests currently about a million dollars a year in research and development, and a major portion of that goes to the aerospace industry as a part of our business.

RETENTION OF SKILLS DURING LAUNCH DELAYS

In terms of retention of young engineers, between our commercial products division operation in Connecticut, and government division operations here in Florida, we have a great cross-section of aerospace work in terms of propulsion systems, small ups and downs. And any one piece of the business doesn't have any significant impact on our young work force. There is plenty of work usually in associated areas that they can be shifted into one or the other portion if their business goes up and down. See, we had very good luck over the last few years in the retention of people and providing what they considered to be adequate technical challenges to keep them interested. We do maintain an active yearly hiring campaign to get new college students into the company.

Chairman CHILES. Mr. Ordahl?

MCDONNELL DOUGLAS

Mr. ORDAHL. Well, of course, McDonnell Douglas has been involved in space since really the beginning. And we are, of course, very interested in continuing to make investments that relate to our increases of capability in space. For example, as far as use of discretionary funds, for example, we might have, let's say, 400 to 500 people currently on the Space Station proposal activities, or waiting station proposal activities, preparing for it. We made considerable investments in the commercial aspects that states over a period of years, starting back in 1975, we upgraded the Delta with the first commercial investment in space, following through to the CAM program, and the collective recent operations in space. We have flown a number of times in the Shuttle.

I think those investments are on the order of somewhere between $100 and $200 million of straight company time. So, we are very interested in supporting space in that regard.

RETENTION OF SKILLS DURING LAUNCH DELAYS

With regard to young engineers we, of course, as others have indicated, support that a great deal. We have support of the local universities. We are doing a number of support activities on the computer facilities. Things like artificial intelligence, for example, is an area that is one which the universities and students involved seem to have—are very adept at getting involved in, and that's good.

We, for example, often send our young engineers to the field here in Florida, if you will, to our test centers from California to here to get good hands-on experience working in the hardware, and get good hands-on knowledge from the other, more experienced engineers that are involved in working with the hardware in our test centers. So, those young engineers sometimes then return to the home plant as far better practical engineers for having that experience.

Chairman CHILES. Thank you, sir.

NEW SHUTTLE IS UPGRADED

Mr. Merrick, in the fourth orbiter that we were building to replace the *Challenger*, are we buying an upgraded Shuttle? In other words, are there new opportunities for building a fourth orbiter to use new technologies, or are we basically just going to fix the problem and that's it?

Mr. MERRICK. It's a combination of each. The fourth orbiter will include the modifications that will be named the 103, which will be available to fly next year. But we, on a continuing basis, have been upgrading hardware and equipment in the orbiters. And the fourth orbiter will be a replacement orbiter and will fundamentally participate in that type of upgrade. We probably, on our third generation central computer unit, we are upgrading the inertial measuring units. A lot of the avionics are able to very definitely keep up with the newer technologies and give us a better performance, lower power usage, and lower volume requirements. So we have been able to, in an evolutionary way, upgrade the fleet, so to speak. And the fourth orbiter will not be a step away from that fundamental policy. It will be an upgraded version, but nothing that's unique.

Chairman CHILES. Well, we thank you very much for your testimony. You have been very helpful to us. We appreciate your participation.

Our last panel then will be Mr. Dan Scheurer, who is the Assistant Superintendent for Instruction of the Brevard County School System, and Mr. Jay Burns of the Florida Institute of Technology, and Mr. Joe Keller, the Dean of Instruction, Brevard Community College.

Mr. Scheurer, we will start with you and ask you if you will give us your statement, and then we will proceed from there.

STATEMENT OF JAN CHAINER ON BEHALF OF DAN SCHEURER, ASSISTANT SUPERINTENDENT FOR INSTRUCTION, BREVARD COUNTY SCHOOL SYSTEM

Ms. CHAINER. I am Jan Chainer, representing Mr. Scheurer for the Brevard County School System.

Chairman CHILES. All right.

MUST UPGRADE CURRICULUM TO MEET CHALLENGE

Ms. CHAINER. If education is to meet the challenge of preparing schools to enter science, mathematics and engineering careers, then there are authentic aspects that must be considered. But I would like to focus on these four.

First of all, a strong curriculum that spans the kindergarten through the 12th grades.

In our own school district, we require science for 12 of the 13 public school years, beginning with the kindergarten years and going through the high school. This curriculum emphasis includes advanced programs, also at a high school level, with advanced placement emphasis on the schools as well as advanced placement in calculus, biology and physics.

We are happy to report that we are seeing increases in student enrollment in the physics programs. Over the last 5 years, that enrollment has more than doubled.

We believe, too, that the strong basic curriculum must be augmented by numerous supplemental programs to provide stimulus and challenge to students to continue to support their interests.

One such program that's available in Brevard schools is the Science Research Program, which was begun in the late 1960s through National Science Foundation funding. While that funding is no longer available, we continue strong support of that program.

And in Boston, in grades 7 through 12, an opportunity to research special interests and projects in that depth are typically not available to students until a college level.

Along with the curriculum and the support to the curriculum areas, high quality well-qualified teachers are crucial. And this must be coupled with opportunities for those teachers to update their knowledge and skills on a regular basis.

This is one of the places that we have received strong support from business and industry with the post-secondary institutions here locally, and which we have added to with support from Federal funding supplements, specifically Title II of the Education for Economic Security Act.

And finally—and this really overlaps with all the other things—and that is cooperation with business, industry and higher education. We have numerous programs that are sponsored by local businesses, both for student participation and for upgrading of teacher skills. One such program is Harris Corporation sponsored courses for elementary students in science and in mathematics.

We have programs with the Brevard Community College, and with the University of Central Florida, and opportunities for students to pursue interests in science, mathematics and engineering careers through the Canaveral Counsel of Technical Society Sponsorship.

We are committed to education and believe that at least those four elements that I have mentioned are critical to continued progress.

Chairman CHILES. Thank you, ma'am.

Mr. Burns?

STATEMENT OF DR. JAY BURNS, FLORIDA INSTITUTE OF TECHNOLOGY

Dr. BURNS. Yes. I appreciate the opportunity to discuss some of the aspects of the role of higher education in the space program. This is a very large subject and so I have decided to focus in on a particular problem that is not very well appreciated.

Let me say, by way of background, that the host institution, the Florida Institute of Technology, was formed primarily to service the educational needs of the scientists and engineers that were coming in to Florida to form the Kennedy Space facility. This university was the first university, as far as I know, to establish a degree program in space technology. And this program and its successors have evolved over more than a quarter of a century now. So, I think we are perhaps the longest in the business.

Clearly, the space program needs to attract the brightest and the fastest of our young people. There is no question about that. Equally clearly, these young people find that the realm of space today is the most exciting frontier available to them. It holds for them the same fascination that the airplane and the aircraft industry did 50 years ago.

It is clear, also, that the way to combine this interest of the people and the needs of the space program for this must fall to education. Education has to provide the bridge to transfer the interested young person into a competent professional to work in the space program.

PROBLEM WITH EDUCATION

It is also quite clear that the higher education system in this country is perhaps the world's best at educating scientists and engineers. So, if this is all true, what is the problem, and is there a problem?

I believe that there is. And the problem has gone unrecognized for some time.

The universities have not responded particularly well to the specific problem of educating people for work in the field of space technology and space science.

At the present time, I count only perhaps 15 or 20 such schools in the country that have programs that are recognizable as space science or space technology. That is a rather small number.

FACULTY WITH SPECIAL SKILLS LACKING

I think that there is a good reason for this, and this is why I bring the problem up for your consideration. I think one of the difficulties is that we lack faculty who have special training to work in this particular field. And I think there is a reason for that, also.

The universities are organized along disciplinary lines. Our universities are very good at turning out people in the traditional disciplines of science and engineering. Electrical engineers, mechanical engineers, mathematicians, physicists, and so on.

The problem comes when we are called on to train people across these traditional disciplines. And space science is certainly a very interdisciplinary area. It covers virtually all of the physical sciences, also includes the life sciences, and covers most of the engineering disciplines.

So, the universities have some difficulty in dealing with education, but cuts across these disciplines.

The faculty members do not have suitable incentives to go interdisciplinary. And they don't have, as a rule, and certainly in the case of space science, access to the kind of retraining or training that they need to teach areas outside of their own school.

This is where the problem arises. We need some mechanism to help train and retrain faculties in space science and technology oriented areas. We need to establish curriculum and standards in these areas. And we need to provide incentives to establish some additional degree programs, or to enrich existing programs.

EDUCATION TRUE PROBLEM FOR GOVERNMENT

Now, why is this a Government problem?

Well, I think it is because it is a national problem. Universities will respond to this problem in time, and they do this quite on their own.

The difficulty here is that time is of the essence. We simply don't have time for the natural evolution of university training to cover these fields. Therefore, what is needed here is some prodding and some incentives for the universities, and some help for the universities to make this transition.

It seems to me that what is needed is a joint NASA industry and university mechanism, probably led by NASA, to provide a new kind of technology transfer. NASA's been quite successful at technology transfer in quite specific areas. What we need here really is a transfer of expertise from NASA industry and those universities that have it to faculty members of other universities and colleges that need to be able then to teach courses in space science and technology, or related to these, either to enrich regular programs or to expand their programs so we can really have the training capability, and to train all these students, these young people to work in the space program.

We need, more specifically, faculty training programs, workshops and that sort of thing. We need to subsidize and support the textbook writing. That is strange, very tightly focused type of thing, but it is quite important.

Early in the 1960s, NASA had the foresight to subsidize and to encourage production of a very impressive series of volumes on space science and technology that existed then.

This series is now far out of date and it is also out of print. There has been no follow-up on this. The faculty member now who wants to find out, for example, what is going on in the design of our space structures has a difficult problem in doing this. He has no access to the real expertise which is contained within NASA and within the industry.

So, something needs to be set up to provide all of these facilities for getting the information across to the place where it can then be taught to the student.

In addition, NASA and industry should perhaps provide scholarships, cooperative education opportunities and publicity to attract student involvement.

I think NASA has a key role to play here. I think that they must approach the past with the full realization of its importance to them and their future. NASA, after all, and the space program, have to rely on the efficient training of the students to form the backbone of their operations.

They must be willing to take the lead and put real effort into this. They must be willing to provide personnel and funds over a long term. And we are not talking about 1 year or 2 years. This has to be rather a continuing process, at least for 5 to 10 years.

And they have to recognize higher education as a partner and a supplier in their most important commodity, which is brains. The cost is really, I think, quite low. By NASA's scale, it's hardly more than petty cash, I imagine. But the benefits are enormous, and the benefits are virtually the continuation of the United States need in space exploration and the developments of space in the future.

Thank you.

Chairman **Chiles**. Thank you, sir.

Now, I would hear from Mr. Joe Keller, who is the Dean of Instruction at Brevard Community College.

Dr. Keller?

STATEMENT OF DR. JOE KELLER, DEAN OF INSTRUCTION, BREVARD COMMUNITY COLLEGE

COMMUNITY COLLEGES PROVIDE SKILLED EMPLOYEES

Dr. **Keller**. Mr. Chairman, I would like to review briefly the role of the Community College in providing highly skilled technicians and the mechanics to support the work force at KSC and other aerospace industries across the Nation.

In addition to the providing of these highly skilled technicians, the community colleges across the nation play an important role in upgrading the existing work force in the associated high tech industries, and also make a contribution to human resource support and development.

I am going to make a few remarks about specific programs at Brevard Community College, but these are representative of programs that exist across the Nation.

The area of upgrading skills through employment, community colleges and other adult vocational schools across the Nation are providing up-to-date training in electronics, quality control, computer programming, and the latest applications of the computer for drafting and machine tools, and those sorts of things.

The colleges also are a source of training to this work force with short courses in seminars, similar to one we conducted recently in the transportation of hazardous materials, new quality control supervision techniques.

Also, Brevard Community College was delighted to have the opportunity to serve the dislocated aerospace workers here in the area immediately following the Challenger tragedy. We are able to obtain funding from the Department of Labor in Washington, and some discretionary funds.

This was somewhat unique in that we were addressing the use of these funds toward a highly skilled work force and not the traditional application of this funding through the unskilled and semi-skilled. This required some change in thinking in terms of the fund administration, that we had found that to be a very, very successful enterprise.

There are some concerns, though, that exist if we are going to be able to maintain our effort in retraining workers. These concerns include the college's ability to fund replacement of training equipment, not because it is worn out, but because the technology has moved so rapidly.

One of the persons in the previous testimony spoke of the need for the Nation to maintain its competitive edge in manufacturing.

If we are going to maintain this edge in manufacturing, then the community colleges and other post-secondary education providers must train the people to manage the robots to program the new tooling, and all of these types of things.

Present funding formulas through Federal vocational funding does not address the needs for these institutions that serve the aerospace and high tech industries.

Secondly, a concern that there must be improved information flow and support to enable the rapid start-up of training programs. The State provides some staffing program development funding for specialized programs. The colleges and universities need information on new trends, new technology, such as the use of non-metalics in McDonnell-Douglas, Martin Marietta and other aerospace companies.

I guess, taking from the local terminology, community colleges need lots of support for us to be able to have the new training programs in place at the time they are needed.

Also commented briefly on our success in providing services for dislocated workers.

EDUCATION/BUSINESS JOINT VENTURES

There are a number of national monuments supported by the foundation trying to bring the educational community and industry together in what is being currently called joint venture projects. Some of this work is being supported by foundations such as the W.K. Kellogg foundation has supported the work of a consortia to address how colleges can better serve major industries.

This has resulted in major contracts and training relationships between United Auto Workers and Ford Motor Company in five States most severely impacted by the loss of jobs in the automobile industry; and more recently were the communications workers and the several bell holding companies across the nation.

These kinds of joint venture effort need to have additional support and may be more especially a national initiative to plan on a long term basis of how we can maintain a very scarce but highly trained work force.

There is a need for an investment in planning and an investment in resources if we are going to be able to maintain the highly skilled labor pool necessary for us to meet the competitive edge in research and manufacturing.

Thank you.

Chairman CHILES. Thank you. I appreciate each of your statements.

FLORIDA LEADS IN GROWTH OF TECHNOLOGY INDUSTRY

We in Florida have been fortunate to be the Nation's leader in the rate of growth of the sophisticated technology industry. We have maintained that for the last 10 years, and that's not by accident, that's through legislative action in business and community and university collaboration—community college and university collaboration such as our Florida high technology and industry council. We have met those challenges facing our research facilities and international competition. Though we can't rest on those past achievements, certainly the results have been encouraging.

MUST BOLSTER MATH/SCIENCE CURRICULUM

The hearing I had last month in Washington, witnesses ranging in occupation from chairman of the board of one of our largest computer manufacturers, David Packard of Hewlett-Packard, to the Governor noted for his involvement in education, Governor Kean of New Jersey, they all agreed to we need to bolster our math and science in the education curriculum for young people.

The executive director of the forum on education in the economy told us that we had to invest more in education so we could adequately prepare younger people to enter in the emerging technology industry to strengthen our corporations.

We heard testimony this morning that almost the majority of our students in engineering and higher degree bearing in our universities are foreign students. I asked the Chancellor of our Florida system if that was true in Florida, and he said it is over 40 percent. And I asked him, was that depriving one of our citizens, an American, of a place in that, and he said, no, they are not qualified.

We don't have enough qualified to go into that because they didn't start the math and science in the 4th and 5th grade. They didn't start with that basis. You have told us—and I am delighted to hear it—Ms. Chainer, that you are seeing an increase in the number of students in physics.

Now, are we starting them at that lower level, and do we have a comprehensive preparatory math and science curriculum for elementary and secondary schools; and if not, how do we start that, and what do you see in the Federal Government's role in trying to leverage or trigger those programs?

Ms. CHAINER. I think we have recognized in the last few years that the elementary preparation is absolutely critical. In this district—and I don't know whether it is unique to this district, though we certainly view ourselves as leaders——

Chairman CHILES. Well, you should be. Because the space workers and the science are here, they are the ones that ought to be motivating their kids. And the only way you are going to do that is certainly you are dealing with an elite population here.

Ms. CHAINER. But in this district we do put a strong emphasis on science and mathematics in the very early grades, and we have done a number of things, including something as simple as requiring a minimum amount of time in all schools be spent on science and mathematics at each grade level. So it is no longer a local school's option. Moving from that to teacher training programs, which would focus on an increased subject area knowledge and teaching skills for elementary school teachers, and putting emphasis on providing schools with science equipment so that the students in the elementary grades do have some hands on the laboratory science and experiments, that does not wait until the student is in the secondary program.

To determine the Federal Government's role, just among the things I have mentioned, is that the Federal funding that we have received has been used to finance some of those initiatives on two fronts. One is in terms of supplementing local dollars for equipment purchases in the elementary schools and science, in particular, as well as computers. Now, that was supplemental dollars.

We did have a significant local commitment of funding already in place. And the second has to do with that ongoing teacher training and constant renewal. These two aspects.

Chairman CHILES. Mr. Burns?

Mr. BURNS. I would say that the influx of foreign students is not necessarily available. The United States keeps about half the graduate students from foreign countries here. And these are best if they come here on the support of their government. They are highly selected. This country has grown strong in force of brain power and other skills. I don't think it is a bad thing at all to have a fairly good influx of——

FOREIGN STUDENTS SUPPLEMENTED BY TAXPAYERS

Chairman CHILES. You are right. It is not all bad. But it is not all good, either, when we have—I asked, again, the Chancellor, what do we charge those students? And he said, the tuition we charge them is regular out-of-State tuition. I asked him how much of the supplemental tuition is paid for by the taxpayers, Federal and State, but our taxpayers? He said, a little over 40 percent.

And it does not make sense to me that we are using a Japanese engineer and we are paying 40 percent of that so he can go back and compete with us and take our technology.

Now, to less developed countries, and to some of these that are staying here, yes. But it is not all good if all these students are staying either, because again many of those in the developing countries that are turning to us again for the hand-out of assistance and Federal aid and all because they are not getting their brain power back, some of that they should get back, but a lot of them ought to maybe go back to those countries where they can do something to better those countries and let us be educating our kids.

Mr. BURNS. That's certainly true. I simply want to point out that it is not unavoidable.

Chairman CHILES. You are right.

Mr. BURNS. As far as the comparable problem with the students, as a result of training or——

Chairman CHILES. What is bad, though, and I think you recognize, is the Japanese with half our population are graduating more engineers than we are. And we cannot find much good about that.

Mr. BURNS. No, it is certainly true, that is not good. And it is true, I think, that the elementary and secondary education of our students falls short of many of the other high tech countries in the world. We catch up and pass them at the university level but——

Chairman CHILES. Yes, certainly. Because they are not putting their dollars in tax because they are using our universities.

Mr. BURNS. But we certainly need to rethink our situation in the primary and secondary education area. We need our students to have the brains, we need to train them better at those levels.

Dr. KELLER. We notice at the Community College an increased interest in physics and the higher mathematics. And that there appears to be a resurge of interest among our young people in these disciplines.

I might point out also that just as the high schools are moving into their advanced placement programs, the Community College joins with them in dual enrollment programs to provide opportunities for higher level training while the young people were still in the high school.

We also have been benefiting from the Title II funding where Community Colleges are now involved in teacher training, providing basic science information for elementary school teachers through a cooperative effort with the school system. And we think if we can continue in this way and increase the interest at that early age, we might attract more of our brighter students to the science community.

MULTIPLE JOBS WAVE OF THE FUTURE

Chairman CHILES. We know that the economists are telling us, and the specialists in work training, that the days of one occupation are gone, and most workers are going to have at least three jobs, and they are going to have to be trained and retrained for those. We know that that work force has to be ready for education and programs designed to allow job training.

The Federal Government insists that we ought to be increasing our investment in adult education and basically in terms of basic literacy, but also in retraining education.

As you know, we are trying to balance the budget, and it has been running amok for the last 6 to 10 years. Increases in one high priority program are going to, of course, decrease in another high priority program.

The Federal law states that only 20 percent of our education program funds can be spent on adults with an 8th grade education or above. Clearly, the Federal program alone is not going to increase these—address these worker needs.

HOW CAN BUDGET DOLLARS BE MOST EFFECTIVE

My question to you all is, How can we invest our limited dollars in the Federal budget to maximize the total effort, or to leverage that total effort?

Dr. Keller, I will start with you.

Dr. KELLER. I think one of the things we could do is to pick up on the—some of the private initiatives, the joint ventures project that I mentioned was supported by the W. K. Kellogg foundation. This has shown educational institutions how they can take advantage of the training of individuals.

For instance, the requirement of the UAW-Ford Motor Co. agreement with about 95 colleges and universities in that area requires the colleges and the universities to assess the prior learning that has taken place in the workplace. So that when we go to retrain these individuals, we are not reteaching some of these skills and technologies that were taught by industry in their private training. So, I think those private initiatives could be enhanced through various consortia. It adds a lot of efficiency.

It is the same thing with the Communications Workers and the Bell holding companies, that they are insisting that before a worker goes back to the college or the university, that the college or university must assess and determine precisely where they are so unneeded training is not provided. This technology is in place here in Florida. We have received some State funding, and during the month of April and May we will be spreading this technology in a modest way throughout the State so that the State system of Community Colleges and area vocational schools will have this tool available. I think that to spread this technology throughout the Nation would be very cost-saving and would address the issue of leverage.

Chairman CHILES. Ms. Chainer, do you agree?

Ms. CHAINER. Yes, sir, I do. In addition—well, this does not address specifically—that adult education I think has impact on this. And that has to do with dropout prevention programs, for lack of a better term.

We need to do a better job of retaining all of our students. We do a good job of retaining a large number of students, but we need to work on retention of virtually all students to help them maximize their opportunities in grade 12 so that they do not become a part of that adult illiterate group.

Chairman CHILES. Yes, sir.

Dr. BURNS. Yes, sir. I think it has become evident that in the high technology areas it is necessary to higher educational fields to provide an easy access for engineers and scientists working in industry to continually upgrade their knowledge over their whole careers.

I think that the universities need to have some incentives to do this. Here at FIT, the school has, from the very beginning, tried to position its graduate programs, evening times and so on, so that people in local industry could take advantage of those. This is the exception rather than the rule. Most universities do not do this. I think that those that are located near high tech centers need to make some conscious effort to provide this kind of easy access for the people in industry to come back and continue their education.

Chairman CHILES. Thank you very much. You are an interesting panel, and I appreciate very much your expertise.

And we will recess our hearings now and this basically would conclude our budget hearings. Thank you.

[Whereupon, at 12:45 p.m., the committee was adjourned.]

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